A critical appraisal of research in arts, health and wellbeing

Edited by: CLIFT, Stephen, KREUTZ, Gunter, PRITCHARD, Stephen, TAN, Michael, LEHIKOINEN, Kai, DE QUADROS, Andre, COREN, Esther and PHILLIPS, Kate

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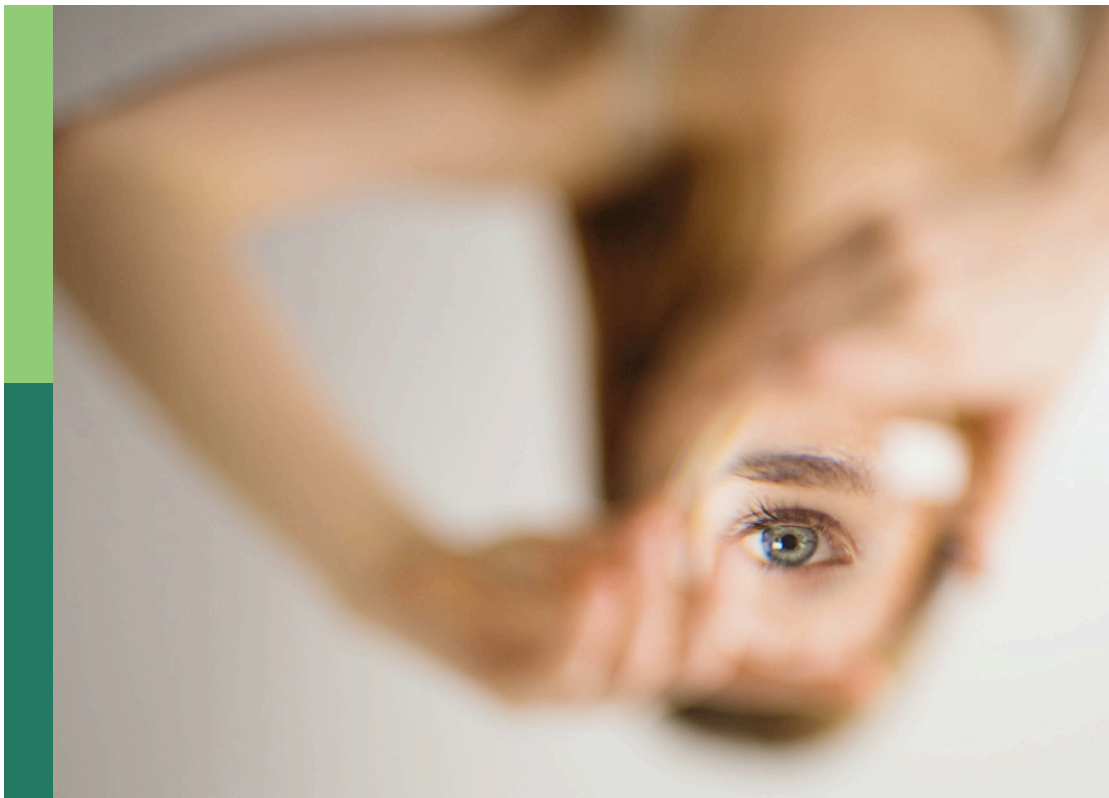
Published in
Frontiers in Psychology



ISSN 1664-8714
ISBN 978-2-8325-2731-3
DOI 10.3389/978-2-8325-2731-3

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A critical appraisal of research in arts, health and wellbeing

Topic editors

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Citation

Clift, S., Kreutz, G., Pritchard, S., Tan, M. K. B., Lehikoinen, K., De Quadros, A., Coren, E., Phillips, K., eds. (2023). *A critical appraisal of research in arts, health and wellbeing*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-2731-3

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frontiers in Psychology

ORIGINAL RESEARCH
published: 17 June 2021
doi: 10.3389/fpsyg.2021.669899

Measurement of Shared Social Identity in Singing Groups for People With Aphasia

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Community groups are commonly used as a mode of delivery of interventions for promoting health and well-being. Research has demonstrated that developing a sense of shared social identity with other group members is a key mechanism through which the health benefits of group membership are realized. However, there is little understanding of how shared social identity emerges within these therapeutic settings. Understanding the emergence of shared social identity may help researchers optimize interventions and improve health outcomes. Group-based singing activities encourage coordination and a shared experience, and are a potential platform for the development of shared social identity. We use the "*Singing for People with Aphasia*" (SPA) group intervention to explore whether group cohesiveness, as a behavioral proxy for shared social identity, can be observed and tracked across the intervention. Video recordings of group sessions from three separate programmes were rated according to the degree of cohesiveness exhibited by the group. For all treatment groups, the final group session evidenced reliably higher levels of cohesiveness than the first session (t values ranged from 4.27 to 7.07; all p values < 0.003). As well as providing confidence in the design and fidelity of this group-based singing intervention in terms of its capacity to build shared social identity, this evaluation highlighted the value of observational methods for the analysis of shared social identity in the context of group-based singing interventions.

Keywords: social identity, stroke, cohesiveness, groups, process evaluation, health, aphasia, singing

OPEN ACCESS

Edited by:
Stephen Clift,
Canterbury Christ Church University, United Kingdom

Reviewed by:
Jeanette Tamplin,
University of Melbourne, Australia
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University of Derby, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *19 February 2021*
Accepted: *10 May 2021*
Published: *17 June 2021*

Citation:
Tarrant M, Lamont RA, Carter M, Dean SG, Spicer S, Sanders A and Calitri R (2021) Measurement of Shared Social Identity in Singing Groups for People With Aphasia. Front. Psychol. 12:669899. doi: 10.3389/fpsyg.2021.669899

INTRODUCTION

Group singing, and the arts more generally, is often used in community settings to promote and maintain health and well-being (World Health Organisation, 2019). Evidence supports the effectiveness of these interventions among a variety of groups and in a number of health domains (Poscia et al., 2018; World Health Organisation, 2019; Pohl et al., 2020). A recent World Health Organization review of arts and music-based interventions commented on the role of the group context alongside arts-based activity in allowing for experiences of social cohesion and meaningful

connection to others (World Health Organisation, 2019). More formally, group interventions that promote the development of *shared social identity (SSI)* among group members appear more likely to elicit the intended outcomes (e.g., improved health and well-being) than those interventions in which recipients fail to come together *as a group*, or are characterized by high levels of conflict between group members (Sani, 2005; Nackers et al., 2015; Borek et al., 2019; Tarrant et al., 2020). By understanding the social identity processes that contribute to positive (health) outcomes, and the factors that account for variability in their success, group-based singing (and other group) interventions can be optimized (Moore et al., 2015; Richards and Hallberg, 2015; Levati et al., 2016). To this end, the current paper reports on the emergence and progression of SSI in the context of a group-based singing intervention for people with post-stroke aphasia (Tarrant et al., 2018).

SHARED SOCIAL IDENTITY IN GROUP-BASED INTERVENTIONS

A substantial body of evidence shows that shared social identity (SSI)—the sense of connection and meaning that individuals may develop in group-based interventions—is an important determinant of health outcomes (Haslam et al., 2009, 2018). Summarizing this evidence, a recent systematic review and meta-analysis of 27 studies that sought to build SSI, found a moderate-to-strong impact of the group interventions on health outcomes, and strongest effects emerging in interventions that successfully built SSI (Steffens et al., 2019). Haslam et al. (2018) have articulated the core hypotheses that specify relationships between group membership, SSI processes, and health. A key hypothesis from the *Social Identity Approach to Health* is the identification hypothesis, which states that *"a person will generally experience the health-related benefits or costs of a given group membership only to the extent that they identify with that group"* (p. 17). Among other things, this means that when someone identifies themselves in terms of a social group membership (e.g., as a member of an intervention group), the group has a greater potential to facilitate access to the range of psychological resources that promote health and well-being.

Indeed, group-based interventions that equip people with the necessary knowledge, skills and confidence to form new social identities have been shown to have a marked impact on psychosocial health (e.g., reduced loneliness, depression and anxiety, and improved well-being among adults) (Haslam et al., 2016, 2019). Explaining the process underpinning these effects, research has shown that identifying with a social group provides the foundation for the provision and receipt of essential social support, acts as a buffer to protect against negative social stigma, provides meaning and connection, allows for positive social influence, and nurtures a sense of collective efficacy (Levine and Thompson, 2004; Smith and Woodworth, 2012; Alnabulsi and Drury, 2014; Greenaway et al., 2016; Tarrant et al., 2017, 2020; Haslam et al., 2018). In accordance with this, the social identity model of behavior change describes key actions that group facilitators can apply to encourage the formation of SSI amongst intervention recipients (Tarrant et al., 2020). Purposely targeting social identity processes may be essential in those group contexts which rely on a positive group dynamic for the smooth functioning of the intervention (e.g., peer support groups; psychotherapy groups; shared activity groups) (Tarrant et al., 2020).

SHARED SOCIAL IDENTITY AND SINGING GROUPS

It has been argued that joint music-making activities are uniquely placed to promote SSI through their use of synchronous activity that involves shared attention and achievement (Launay et al., 2013; Weinstein et al., 2016; World Health Organisation, 2019). Group-based singing allows for social interaction that is inclusive of the whole group and not bound by turn-taking as with other social interaction (Kreutz, 2014; Weinstein et al., 2016). In accordance with this, some research has found greater self-reported social connectedness, social identification and qualitative reports of a sense of belonging among those participating in group-based singing interventions (Clift and Hancox, 2001; Joseph and Southcott, 2015; Pearce et al., 2015; Weinstein et al., 2016; Dingle et al., 2020). A number of studies have also evidenced this social bonding effect in singing groups by showing elevation of endorphins linked to positive affect and affiliative behaviors (Kreutz, 2014; Weinstein et al., 2016). However, other research has indicated that it may not be singing, but instead the experience of group-based activities in general and greater time spent together that predict greater connection with the group (Pearce et al., 2016; Bullack et al., 2018). Building upon this research, the current study measures and examines the progression of SSI within a group-based singing intervention as a key mechanism through which it might cultivate positive outcomes.

The Singing for People with Aphasia (SPA) trial is a pilot randomized controlled trial (RCT) of a group-based singing intervention aimed at improving psychosocial outcomes in people with stroke-related aphasia (Tarrant et al., 2018, 2021). Beyond difficulties in language function, many people with post-stroke aphasia report experiences of social exclusion and reduced levels of social activity (Cruice et al., 2006; Parr, 2007; Vickers, 2010). The SPA intervention was informed by the social identity approach to health (Haslam et al., 2018) and the social identity model of behavior change (Tarrant et al., 2020), and was designed to encourage the formation of SSI among the recipients (Tarrant et al., 2018). Alongside singing and music-making, other activities were built in to the intervention to encourage this process, including group-level feedback and encouragement from facilitators, identification of similarities between group members (e.g., recognizing shared interests in music and singing), group goal setting, inclusive language, and also refreshment breaks to encourage member social interaction and personal disclosure (Tarrant et al., 2016). The trial process evaluation included an assessment of the group processes that were active during the

intervention sessions—and specifically the extent to which group members exhibited a sense of SSI.

Within group-based singing and other group-based interventions for health, self-report measures are most commonly used to assess SSI (or similar), usually at a single time-point, or two time-points (e.g., before and after delivery of the intervention) (Pearce et al., 2015; Weinstein et al., 2016; Steffens et al., 2019). The administration of self-report measures was deemed to be unacceptably burdensome to SPA trial participants, many of whom had severe language impairments as a result of their aphasia. The SPA trial therefore employed an observational approach that involved the video-recording of the group sessions for later analysis by independent coders. As well as alleviating concerns about participant burden, video-recording of group sessions allowed for assessment of the progression of SSI across the course of the intervention [and could also capture potentially important fluctuations in it (Dunton, 2018)]. The assessment of SSI using observational methods is a novel approach in social identity research; and so there is no validated tool specifically targeting this construct in this way. The study therefore adopted a measure previously used within group therapy contexts that assesses the degree of "cohesiveness" that group members exhibit. Group cohesiveness is closely associated with SSI, both theoretically and empirically and allows for the observation of behaviors indicative of a sense of connection between group members (Hornsey et al., 2007).

MATERIALS AND METHODS

SPA Pilot Feasibility RCT

Full methodology for the current pilot RCT has been reported elsewhere (Tarrant et al., 2018, 2021). Individuals eligible for participation in the trial were: those with post-stroke aphasia; 18+ years of age; and had completed any post-stroke speech and language rehabilitation. Individuals currently participating in singing groups or other lifestyle interventions were excluded from the trial. Forty-one participants were recruited to the RCT. These individuals were randomized 1:1 to receive either the SPA intervention along with a resource pack in aphasia-friendly format, which provided information on living with aphasia and available local community services (N = 20), or to the control arm (N = 21) in which the participants received the resource pack only. Singing groups were run in three locations across the South West of England—Group A (N = 7), Group B (N = 7), and Group C (N = 6). Group sessions were facilitated by an expert community music leader and assisted by a person with aphasia. The intervention comprised ten weekly sessions, with each session lasting 90 min. There was flexibility to the structure and content of the sessions (e.g., groups were allowed to choose which songs to sing), but each session included: a settling-in phase, a singing warm-up, and a main singing phase which was punctuated by a break lasting around 20–30 min. Each group established a group goal that involved working toward a final activity (performance for family/friends or development of a "playlist").

Assessment of Shared Social Identity

The first nine sessions of the intervention were video-recorded (set-up and operated by a researcher) for all three groups. The tenth session was recorded for only one group—Group B—because Groups A and C both chose to do a public performance for their 10th session and we did not have consent to film this. For each group, the 90-minute recording was divided into nine, 10-minute segments, giving approximately 81 segments per group (90 for Group B)[1] (World Health Organisation, 2019). These segments were randomized in order to blind the independent coders to the segment's position within the programme, therefore mitigating the risk of biased ratings.

A standard operating procedure was developed for the coding of the video data from the singing sessions. SSI was assessed using the single item measure of global cohesiveness from Budman et al. (1987)'s Harvard Community Health Plan Group Cohesion (HCHP-GCS) scale. Using this scale, each session segment was rated on the degree to which the group *as a whole* appeared cohesive vs. fragmented. Ratings were made on an 11-point bipolar scale, ranging from −5 (very strong fragmentation) to + 5 (very strong cohesion). A score of zero indicated that there was no evidence of either fragmentation or cohesion (i.e., that the construct was not present). Two independent coders were trained (∼3h of training) to code video segments using the standard operating procedure. The training taught coders to consider the extent to which the group members collectively displayed a sense of "groupiness," as reflected in (high) levels of involvement in the session activities, both while singing (e.g., singing together) and also during the planned session breaks (e.g., engagement in group conversations). Training was iterative in that an initial sample of coding was compared against ratings provided by members of the research team. If ratings departed by more than two points on the scale, coders performed another round of training and the standard operating procedure was revised where necessary. This process was followed until consensus between raters was established (this happened after three rounds of rating). One independent rater coded all video segments (all three intervention groups), and the second coder rated all segments from a single group; an inter-rater agreement score was calculated for this group.

Statistical Analysis

After completion of the coding, the video segments were re-ordered into their original sequence for analysis. Degree of coder agreement was assessed with a Pearson bivariate correlation between each coder's average cohesiveness session score. Cohesiveness scores for each session were calculated for each group (i.e., the nine Group A segment scores for week 1 were averaged to create an overall score for that particular session of the programme for that group). Change in global cohesiveness between week one and the final recorded session, for each singing

[1]There was some minor variation in total number of segments per session across the three groups due to video camera failure (e.g., week nine of Group A, when there were only six segments) or due to the session finishing slightly early. One session overran, creating more than nine segments (week two of Group B had 11 segments).

group, was assessed using paired sample *t*-tests. All analyses were completed using IBM SPSS Statistics 25.

RESULTS

Table 1 presents participant characteristics for each of the three singing groups.

Cohesiveness

There was a high level of agreement in cohesiveness ratings between the independent coders $r(9) = 0.85$, $p < 0.005$. Patterns of group cohesiveness were consistent across each of the three cohorts. At the beginning of the intervention, each of the three groups reported relatively low levels of cohesiveness (with no scores < 0, indicating no fragmentation) and there was a clear upward trend in cohesiveness across the intervention (**Figure 1**). Cohesiveness was reliably higher at the end of the intervention compared to the beginning, for all three groups (**Table 2**).

DISCUSSION

While groups are now a common mode of delivery for a wide range of behavior change and health interventions—including arts and music-based—understanding of the social identity processes that may shape an intervention's impact is limited and rarely targeted in formal trial evaluations (Steffens et al., 2019). The current paper therefore examines social identity within the SPA intervention, designed specifically to encourage the development of SSI among intervention recipients (Tarrant et al., 2016). SSI, usually captured through retrospective self-reports, was instead assessed using an observational proxy: group cohesiveness (Budman et al., 1987). The analysis indicated a clear upward trend in group cohesiveness (indicative of SSI formation) across the intervention group sessions, with the final session evidencing reliably higher levels of cohesiveness than the initial session. These effects were found to be consistent across the three groups investigated, suggesting that the participants internalized the group intervention in similar ways. Interviews with intervention facilitators and participants who took part in the research support this conclusion and indicated that the SPA intervention promoted a strong sense of SSI between recipients [reported elsewhere (Tarrant et al., 2021)].

These findings give greater confidence both that this novel approach to investigating SSI warrants further investigation as an indicator of the construct (Hornsey et al., 2007), and also that the intervention elicited the intended social identity processes. Methodologically, the observational approach has allowed for an analysis of the progression of SSI in a way that would not have been possible with other more common, retrospective, self-report approaches, and in a way that did not burden the research participants. Extending this point, the high levels of inter-rater reliability achieved here demonstrate the potential feasibility of employing observational methods to capture group phenomena and opens up the possibility that this approach could similarly be employed to measure other group processes that contribute to (and flow from) SSI in intervention settings, such as social support, positive social influence, and group efficacy (Haslam et al., 2018).

An interesting question arises concerning the potential contribution of different intervention activities to the development of shared social identity. In the current analysis, our focus has been on shared social identity at the level of the session as a whole (i.e., comparing session cohesiveness scores across the intervention programme). It is possible that some session elements may have more strongly contributed to the development of shared social identity than others—for example, the more "informal" elements that allow for the natural formation of social connections (e.g., unstructured conversation during arrival at/departure from the session; mid-session breaks). Although we did not code individual participant actions that may be expected to contribute to the development of cohesiveness in such elements, the current approach to analysis, which involved the coding of pre-determined timed segments, can provide a basis for future research where a more targeted analysis is demanded by the research questions (e.g., coding singing vs. non-segments elements).

TABLE 1 | Participant demographics within each singing group.

	Group A *N* = 7	Group B *N* = 7	Group C *N* = 6
Gender: *N* females	2	2	4
Age (years): *M* (SD)	64 (15.15)	62 (9.49)	71 (11.01)
N attending ≥ 80% sessions	5	5	4
N mild aphasia[1]	4	5	5
Time since stroke (years): *M* (SD)	5 (4.97)	5 (3.93)	3 (1.76)
N carers/guests in attendance[2]	2	3	3

[1] *Other participants having "moderate or severe" aphasia. The very short version of the Minnesota Aphasia Test (Powell et al., 1980) was administered at baseline. Participant responses were reviewed by CC, an aphasiologist, who calculated severity and type of aphasia.*

[2] *Participants' carers/guests did not attend every session and did not always join in the singing/group activity. The facilitator was present at each session and the singing champion was present at almost all sessions.*

Study Limitations

The aim of the current study was to document the progression of SSI across the course of a group-based singing intervention. The findings do not allow for any inferences to be made regarding the consequences of developing SSI for the intervention outcomes. A priority for a future, definitive trial of the SPA intervention will be to test the effectiveness of the intervention on health outcomes; the process evaluation for that trial will formally test whether these outcomes are causally related to SSI developed within the context of the intervention group (and indeed to any fluctuations in SSI). The current study outlines a methodology that can support such an assessment of trial processes.

Despite its clear advantage in terms of supporting the detailed examination of social identity processes, the observational approach adopted here is resource intensive in terms of the

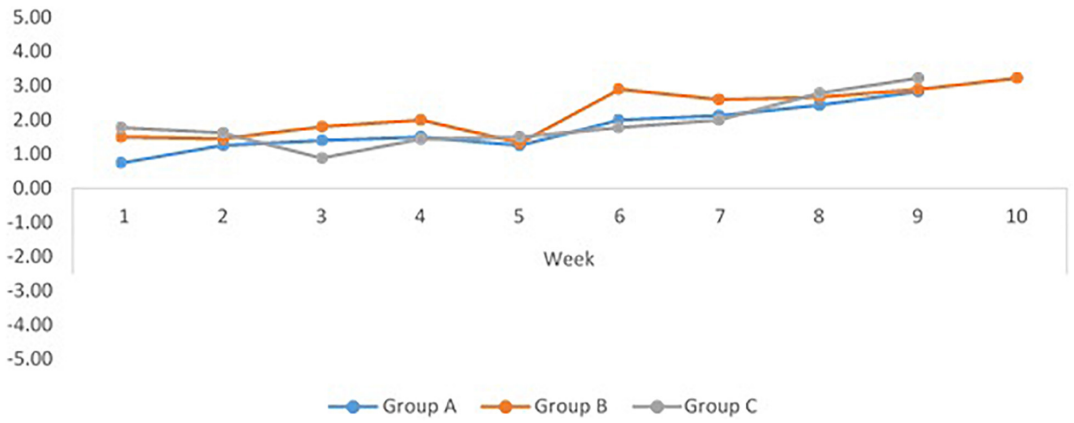

FIGURE 1 | Progression of global cohesiveness across the intervention programme (weeks 1–10), for each singing group (negative scores indicate fragmentation; positive scores indicate cohesiveness).

time required to code the data. It is also possible that the mere presence of a video camera and operator during group sessions may be experienced by some participants as intrusive, and this itself may affect the group's behavior—although we point out that there was no evidence of this in the current trial. However, repeated administration of self-report measures of SSI and other group processes may also be intrusive, and likely fatiguing for some, especially those living with chronic health conditions. With careful management of the group's expectations, any potential negative impacts of video recording may be minimized.

Finally, while the current analysis indicated a clear upward trend in group cohesiveness, or SSI, it is not possible to say here what a "desirable" level of this construct might be (i.e., there is no clinically significant value assigned to the social identity construct). Thus, while there was a reliable difference between scores at the beginning and end of the SPA intervention (and no segment scores that indicated group *fragmentation*), the precise *meaning* of this difference beyond it being *different* is unclear. This is not an issue unique to this methodology: the authors are not aware of any research which has sought to determine the meaning of individual scale points on (self-report) measures more commonly employed to assess SSI. It would be of obvious benefit to future process evaluations of group-based interventions (and social identity research more generally) to be able to determine the level of SSI that is necessary to shape the desired intervention outcomes.

TABLE 2 | Cohesiveness at the beginning and end of the intervention, by group.

	First Session		Final Session		Comparison between sessions		
Cohort	**M**	**SD**	**M**	**SD**	**t**	**df**	***p***
Group A (*N* = 6*)	0.67	0.82	2.83	0.41	−5.40	5	0.003
Group B (*N* = 9)	1.56	0.53	3.22	0.44	−7.07	8	<0.001
Group C (*N* = 9)	1.78	0.83	3.22	0.44	−4.27	8	0.003

**Six segments only: See footnote 1.*

CONCLUSION

This study employed a systematic observational method to investigate a group process shown previously to be a key determinant of health: SSI. The analysis revealed a steady increase in a proxy measure of this construct (group cohesiveness) across the course of the 10-week group-based singing intervention. Beyond allowing for the testing of fidelity of this kind of singing intervention, the study has helped establish a methodology by which SSI can be assessed directly, *in situ*. As well providing a non-burdensome alternative to repeated self-report measurements, this methodology may allow for the mapping of behavioral exemplars and other key group processes that flow from SSI, and can thereby enhance future process evaluations of group-based interventions.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because participants did not consent for datasets to be stored or accessed outside of the research team. Requests to access the datasets should be directed to MT, m.tarrant@exeter.ac.uk.

ETHICS STATEMENT

The trial was reviewed and approved by the Health Research Authority (HRA) and NHS National Research Ethics Service and Research, *via* the Southwest—Frenchay Research Ethics Committee (17/SW/0060). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MT led the project team and was principal investigator. RL led the completion of the manuscript. MC was trial researcher. SD

led the main process evaluation of the SPA trial. SS served as independent coder of session segments. AS was trial researcher and supported trial closure. RC was trial manager and researcher and supported all aspects of the trial. All authors reviewed the article for publication.

FUNDING

The trial is funded by the Stroke Association (QQ12/TSA 2016/14). Excess treatment costs have been covered by South Devon and Torbay Clinical Commissioning Group, North East and West Devon Clinical Commissioning group, and the University of Exeter Medical School. This report is independent research supported by the National Institute for Health Research Applied Research Collaboration South West Peninsula. The views expressed in this publication are those of the author(s) and not necessarily those of the National Institute for Health Research or the Department of Health and Social Care.

ACKNOWLEDGMENTS

Plymouth Music Zone (PMZ) is an outreach charity that works in partnership with health, community and social care organizations to provide tailored, participatory music services to vulnerable or marginalized groups of all ages across Plymouth. It also enables Music Leaders to work in a diverse range of settings and shares its learning around developing inclusive practice and leadership across the South West of England and further afield. PMZ supported the development and delivery of the SPA intervention. We are grateful to PMZ, and their Creativity and Learning Director Anna Batson in particular, for the support with the SPA project.

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Conflict of Interest: All authors report the Stroke Association funding for the work under consideration but no other conflicts of interest.

frontiers in Psychology

ORIGINAL RESEARCH
published: 21 July 2021
doi: 10.3389/fpsyg.2021.648062

Effects of Mindfulness Meditation on Musical Aesthetic Emotion Processing

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Mindfulness meditation is a form of self-regulatory training for the mind and the body. The relationship between mindfulness meditation and musical aesthetic emotion processing (MAEP) remains unclear. This study aimed to explore the effect of temporary mindfulness meditation on MAEP while listening to Chinese classical folk instrumental musical works. A 2 [(groups: mindfulness meditation group (MMG); control group (CG)] × 3 (music emotions: calm music, happy music, and sad music) mixed experimental design and a convenience sample of university students were used to verify our hypotheses, which were based on the premise that temporary mindfulness meditation may affect MAEP (MMG vs. CG). Sixty-seven non-musically trained participants (65.7% female, age range: 18–22 years) were randomly assigned to two groups (MMG or CG). Participants in MMG were given a single 10-min recorded mindfulness meditation training before and when listening to music. The instruments for psychological measurement comprised of the Five Facet Mindfulness Questionnaire (FFMQ) and the Positive and Negative Affect Schedule (PANAS). Self-report results showed no significant between-group differences for PANAS and for the scores of four subscales of the FFMQ ($p > 0.05$ throughout), except for the non-judging of inner experience subscale. Results showed that temporary mindfulness meditation training decreased the negative emotional experiences of happy and sad music and the positive emotional experiences of calm music during recognition and experience and promoted beautiful musical experiences in individuals with no musical training. Maintaining a state of mindfulness while listening to music enhanced body awareness and led to experiencing a faster passage of musical time. In addition, it was found that Chinese classical folk instrumental musical works effectively induced aesthetic emotion and produced multidimensional aesthetic experiences among non-musically trained adults. This study provides new insights into the relationship between mindfulness and music emotion.

Keywords: meditation, mindfulness, music aesthetics, music emotion, beauty

OPEN ACCESS

Edited by:
Gunter Kreutz,
Universität Oldenburg, Germany

Reviewed by:
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The University of Queensland, Australia
Yuanxiao Ma,
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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *31 December 2020*
Accepted: *21 June 2021*
Published: *21 July 2021*

Citation:
Liu X, Liu Y, Shi H and Zheng M (2021) Effects of Mindfulness Meditation on Musical Aesthetic Emotion Processing. Front. Psychol. 12:648062. doi: 10.3389/fpsyg.2021.648062

INTRODUCTION

Music, as a temporal auditory art, tends to evoke aesthetic emotions (Scherer, 2004; Frijda and Sundararaja, 2007). The aesthetic values of music are capable of inducing a much more nuanced range of emotive states than discrete emotions outlined in the traditional emotion models (Zentner et al., 2008). Previous studies suggest that music evokes emotions that are significantly different from utilitarian emotions; emotions evoked by music are more often aesthetic than utilitarian

(Stecker, 2006; Nieminen et al., 2012; Silvia et al., 2015; Reybrouck et al., 2018; Menninghaus et al., 2019). Many aesthetic emotions, although positive overall, encompass negative or mixed emotional ingredients, which are measured by domain-specific models (Barrett et al., 2010; Larsen and Stastny, 2011; Swaminathan and Schellenberg, 2015; Menninghaus et al., 2019; Cowen et al., 2020). Theoretical approaches have verified that domain-specific models might be more appropriate (Zentner et al., 2008; Zentner, 2010; Zentner and Eerola, 2010) compared to the classical theories of basic emotions that concern fear, anger, or joy, for example (Ekman, 1992), or dimensional models that describe all the affective experiences in terms of valence and arousal (Russell, 2003). This study is based on the aesthetic emotion theory, which is a domain-specific model of emotion (Zentner et al., 2008; Menninghaus et al., 2019).

Previous studies have shown that the processing of music aesthetic emotion involves the multidimensional measurement of both the psychological and the behavioral phenomena (Brattico et al., 2016; Menninghaus et al., 2019). Neuroscientific evidence shows that music evokes complex emotions beyond pleasant/unpleasant or happy/sad dichotomies (Nieminen et al., 2011; Brattico et al., 2016; Menninghaus et al., 2019). The processing of music aesthetic emotion is closely related to the emotional response, aesthetic judgment, and aesthetic preference of an individual while listening to music (Schubert, 2007; Barrett et al., 2010; Nieminen et al., 2012; Brattico et al., 2013; Lee et al., 2013; Orozco, 2015). The emotional response to musical aesthetics involves two processes, emotional recognition (emotion expressed by music) and emotion experience (emotion experienced by subjects) (Schubert, 2013; Schindler et al., 2017; Schubert and North, 2020), both of which are regarded as a continuum of aesthetic emotion processing (Eerola and Vuoskoski, 2011; Swaminathan and Schellenberg, 2015; Scherer et al., 2019). A forced choice task (FCT), wherein the judges were asked to select from several pre-selected emotion labels, was used to evaluate the recognition and experience of music emotion (Laukka and Juslin, 2007; Eerola and Vuoskoski, 2011; Laukka et al., 2013). Even though the forced-choice methodology produces an ecologically valid task, the participants were further required to rate the intensity of each stimulus on the Likert scale (Laukka and Juslin, 2007). The forced-choice response paradigm is a simple, clear, and methodologically strong technique that provides robust results (Frank and Stennett, 2001, p. 1). The Geneva Emotional Musical Scale (GEMS) is an effective psychometric scale based on the theory of aesthetic emotion and employs suitable ecological musical works as stimulus materials (Zentner et al., 2008; Vuoskoski and Eerola, 2011; Trost et al., 2012). The GEMS acts as an effective tool for exploring the behavioral characteristics and psychological mechanisms of Musical aesthetic emotion processing (MAEP). It is a nine factorial music emotion model comprising wonder, transcendence, tenderness, nostalgia, peacefulness, power, joyfulness, tension, and sadness (Zentner et al., 2008; Zentner, 2010; Trost et al., 2012). Tension is an important indicator of the physiological changes in an emotional experience and reflects the degree to which the psychophysiological state of an individual could change, from relaxation to tension (Menninghaus et al., 2019; Scherer et al., 2019). Activation/arousal can be used to measure the psychophysiological and neurophysiological intensity induced by music (Barrett et al., 2010; Trost et al., 2012; Vuoskoski and Eerola, 2012; Ellison et al., 2015) and the intensity of the psychophysiological and neurophysiological activation in the domain-general model of emotion (Hölzel et al., 2011a; Bueno et al., 2015; Andreu et al., 2019; Bailey et al., 2019). To facilitate the measurement of the degree of relaxation induced by mindfulness meditation training (Dvorak and Hernandez-Ruiz, 2019; Hernandez-Ruiz and Dvorak, 2020; Loo et al., 2020) and music listening (Baylan et al., 2018; Sorensen et al., 2018), this study selected tension as an indicator of the psychophysiological response of the participants.

The evaluation of aesthetic judgment and aesthetic preference also have an important influence on the processing of the aesthetic emotion while listening to music (Brattico et al., 2016; Menninghaus et al., 2019). Beauty is the core of music aesthetics (Nieminen et al., 2012; Brattico and Pearce, 2013), which appears to be "in the interaction between the stimulus and the beholder's cognitive and affective processes" (Reber et al., 2004, p. 3). Aesthetic judgment is an important measure in experiencing the beauty of music, to better account for typical aesthetic emotions, such as admiration and awe (Juslin, 2013; Schindler et al., 2017). Liking is a comprehensive index reflecting musical preference and personality traits. Some studies have shown that liking was also significantly related to the quality of music and the listening environment (Schellenberg et al., 2008; Brattico et al., 2013). Studies have shown that music preference can effectively predict aesthetic judgments and affect the emotional arousal and intensity of musical enjoyment (Nieminen et al., 2012; Brattico et al., 2016; Menninghaus et al., 2019).

Usually, phenomena such as tension, beauty, and liking in relation to aesthetic emotion recognition and experience would be measured by means of the Likert scale (Schellenberg et al., 2008; Munar et al., 2011; Trost et al., 2012; Juslin et al., 2013; Thammasan et al., 2017; Madsen et al., 2019). Evidence shows that the conceptualization, classification, and measurement of aesthetic emotions (Zentner et al., 2008; Schindler et al., 2017; Menninghaus et al., 2019) have provided important theoretical models and measurement tools for the music aesthetic domain (Zentner et al., 2008; Brattico et al., 2009; Barrett et al., 2010; Zentner, 2010; Trost et al., 2012; Diaz, 2013; Menninghaus et al., 2019), which have had a profound impact on the study of music aesthetics and emotional processing (Nieminen et al., 2012; Brattico et al., 2016; Madsen et al., 2019).

Retrospective evaluation has generally been used to measure the behavioral characteristics of the participants in the experimental research into MAEP (Zentner et al., 2008; Trost et al., 2012; Vuoskoski and Eerola, 2012, 2017; Silvia et al., 2015). However, most of the previous empirical studies have focused on exploring causality or correlation between musical noumena and MAEP, paying little attention to the influence of mindfulness meditation on MAEP (Baylan et al., 2018; Scherer et al., 2019; Hernandez-Ruiz and Dvorak, 2020; Loo et al., 2020; Misba et al., 2020).

Mindfulness, combined with Buddhist meditation, has a long history. Mindfulness is usually defined as "paying attention

in a particular way: on purpose, in the present moment, and non-judgmentally" (Diaz, 2013; Lutz et al., 2014; Rodríguez-Carvajal and Lecuona, 2014). Mindfulness meditation, as a state, trait, or clinical intervention, has been widely used in emotion regulation, attention, psychotherapy, and clinical medicine, among other fields (Brown and Ryan, 2003; Sahdra et al., 2011; Singh et al., 2014; Bueno et al., 2015; Zanesco et al., 2016; Zanesco, 2017; Andreu et al., 2019; Bailey et al., 2019). It has brought many positive effects to people, such as regulated negative emotions, enhanced self-awareness, improved well-being, enhanced psychological function, and reduced stress symptoms, and improved cognitive recovery (Brown and Ryan, 2003; Rodríguez-Carvajal and Lecuona, 2014; Tomaselli, 2014; Anderson, 2016; Bell et al., 2016; Baylan et al., 2018; Sorensen et al., 2018; Loo et al., 2020; Misba et al., 2020). Previous studies have shown a certain relationship between mindfulness meditation and specific music activities (Rodríguez-Carvajal and Lecuona, 2014). Mindfulness-based music listening can increase listening sensitivity and enjoyment (Anderson, 2016; Baylan et al., 2018), improve well-being (Brown and Ryan, 2003; Rodríguez-Carvajal and Lecuona, 2014; Sorensen et al., 2018; Loo et al., 2020), enhance body awareness and listening experiences (Diaz, 2013; Rodríguez-Carvajal and Lecuona, 2014), and decrease psychological stress and anxiety symptoms (Tomaselli, 2014). Specific musical activities, such as listening to mindfulness music, chorus training, music performance, and music creation, could induce a state of mindfulness meditation, which moderates the absorption of musical stimuli by the participants and affects their emotional experiences (Bell et al., 2016; Lynch and Wilson, 2017; Dvorak and Hernandez-Ruiz, 2019).

Previous studies have shown that mindfulness meditation could improve emotion processing (Tan et al., 2014; Bueno et al., 2015; Lei et al., 2016). Mindfulness meditation comprises a process of enhanced self-regulation that can be differentiated into distinct but interrelated components, namely, attention regulation, body awareness, emotion regulation, and a change in self-perception (Hölzel et al., 2011b). Mindfulness-based intervention contributes to inducing a positive emotional state (Brown and Ryan, 2003) and reducing negative emotions (Baylan et al., 2018). Neurophysiological evidence shows that mindfulness meditation causes structural changes in the brain regions involved in learning and memory processes, emotion regulation, and self-referential processing (Davidson et al., 2003; Hölzel et al., 2011a; Lutz et al., 2014; Davidson and Kaszniak, 2015; Tang et al., 2015). Mindfulness meditation training can be divided into three levels according to the training time (Davidson, 2010; Davidson and Kaszniak, 2015; Sayers et al., 2015; Lei et al., 2016): temporary mindfulness meditation training (3 min to 1 h), short-term mindfulness meditation training (4 days to 4 months), and long-term mindfulness meditation training (over 10 years). Studies have shown that both short-term mindfulness meditation training and long-term meditation training affect emotional processing by increasing individual mindfulness and self-awareness and enhancing individual emotional self-acceptance (Lei et al., 2016). Erisman and Roemer (2010) examined the effect of a temporary mindfulness meditation intervention on emotional response in terms of three emotions (sad, positive, and mixed), following the viewing of film clips. The results showed that temporary mindfulness meditation intervention effectively enhanced positive experiences and reduced negative experiences (Erisman and Roemer, 2010). A neuroimaging study showed that temporary mindfulness meditation training enhanced the activation of the prefrontal lobe and reduced the activation of the amygdala and the hippocampus (Lutz et al., 2014). These studies indicate that temporary mindfulness meditation training is an effective method of mood regulation and affected emotional processing (Erisman and Roemer, 2010; Lalot et al., 2014; Lutz et al., 2014; Garland et al., 2015; Lei et al., 2016).

Mindfulness meditation is the intentional awareness of internal and external happenings in the present moment, without judgment, rejection, or attachment to the moment (Kabat-Zinn, 2012; Dvorak and Hernandez-Ruiz, 2019; Hernandez-Ruiz and Dvorak, 2020). It includes two components, namely, regulating the attention of an individual to maintain the immediate experience and approaching the experiences of an individual with curiosity, openness, and acceptance (Lei et al., 2016). The non-judgment and openness experience induced by state mindfulness meditation are highly related to body awareness (Brown and Ryan, 2003; Diaz, 2013; Rodríguez-Carvajal and Lecuona, 2014; Clark et al., 2015; Anderson, 2016; Loo et al., 2020; Misba et al., 2020). Temporary mindfulness meditation training, as a relaxed state of enhanced self-regulation, effectively induces the openness of individuals to experience and non-judging of inner experience by individuals, thereby improving emotion processing (Bishop, 2004; Tan et al., 2014; Bueno et al., 2015; Lei et al., 2016). In addition, changes in time perception may be related to body awareness and openness of the internal experience induced by mindfulness meditation training, which enhances attentional function (Brown and Ryan, 2003; Kramer et al., 2013; Bailey et al., 2019). Mindfulness meditation focuses more strongly on sensory experiences and greater awareness of feelings and of body states, which leads to a slowing down of time in the present moment (Wittmann and Schmidt, 2014). Kramer et al. (2013) found that participants engaging in mindfulness training overestimated the length of time when images were visually presented to them. The authors attribute this to the temporary changes in attention and perception, wherein the participants were more aware and focused at the moment on the task at hand (Kramer et al., 2013). Overall, the maintenance of a relaxed body state and listening sensitivity induced by mindfulness meditation may have important academic and social significance for exploring temporary mindfulness meditation training and MAEP.

Although these studies show the influence of the mindfulness training level on emotional processing (Sayers et al., 2015; Lei et al., 2016), little is known about the influence of mindfulness meditation on MAEP among non-musically trained adults (Diaz, 2013), especially following exposure to the musical aesthetics of Chinese classical folk instrumental music. Thus, far, no study has explored the relationships between mindfulness meditation using natural Chinese classical folk instrumental musical works and MAEP. Past research has shown that music-specific models, emotion validation using multiple psychometric approaches, and ecologically valid music will become more common in

future music emotion research (Zentner et al., 2008; Kumar and Garg, 2010; Eerola and Vuoskoski, 2013; Menninghaus et al., 2019). Accordingly, this study aimed to explore the effect of temporary mindfulness meditation training on MAEP. Music aesthetic tasks include five items, namely, recognition, experience, tension, beauty, and liking. FCT was used to evaluate between-group differences in the recognition and experience of the musical aesthetic emotion. The Likert scale is used to assess between-group differences in tension, beauty, and liking of music aesthetic tasks. After participants had listened to the music, GEMS was used to explore within-subject consistency in evaluating the music aesthetic emotions, verifying that the music emotion belongs to the category of aesthetic emotion (Laukka and Juslin, 2007; Munar et al., 2011; Brattico et al., 2013; Laukka et al., 2013). The differences in musical aesthetic tasks between the MMG and the CG will be investigated to illustrate that temporary mindfulness meditation training has an impact on MAEP, body awareness, and time perception of non-musically trained participants. Based on previous studies, we hypothesized the following:

- First, the scores of recognition, experience, and beauty in the MMG will be higher than that in the CG, while the scores of tension and liking will be lower in MAEP;
- Second, the scores of non-judging of inner experience and time perception of music in the MMG will be higher than that in the CG, while body awareness will be lower;
- Third, Chinese classical folk instrumental musical works will express and induce multidimensional aesthetic emotion.

METHODS

Participants

Participants ($n = 67$; 45 females) without musical training were recruited through campus advertisements. They were required to abstain from taking substances or medications that could potentially influence their concentration. All participants reported that they received no training related to mindfulness meditation. In addition, they were required to disclose any history of major psychological disorders. All participants reported being right-handed, having normal hearing and speech, and a normal or a corrected-to-normal vision. This study was approved by the Southwest University Ethics Committee.

Stimuli

Mindfulness Meditation Audio

The Chinese version of the mindfulness meditation script used in this study was derived from the English version of a mindfulness script (Diaz, 2010). The translation of the text was proofread and revised by two graduate students majoring in English. The audio was recorded by professionals who have been trained in meditation and yoga for 10 years, in a soundproof room using special recording software (Xunjie audiorecorder, Shanghai Information Technology Ltd., www.xunjieshipin.com/download-audiorecorder). The duration of the audio was 10 min. It was recorded in MP3 format (Maattanen, 2003).

Musical Stimuli

The stimuli set consisted of 15 music clips (duration 1 min) from the Chinese classical folk instrumental musical works which were taken from commercially available "kugou" music software (Version 9.1.32MAC, Guangzhou Kugou Computer Technology Co., Ltd, www.kugou.com), which is a professional online music player application. These high-quality music clips included three emotion levels (calm, happiness, and sadness) with five excerpts for each level, categorized according to the emotional valence of music (Nyklíček et al., 1997; Thayer and Faith, 2001; Trost et al., 2012; Russo et al., 2013). The emotional valence of these music materials was assessed by 50 musicians using the nine-dimensional GEMS model (Zentner et al., 2008; Zentner, 2010). In this study, calm, happy, and sad music had Cronbach's alpha values of 0.88, 0.85, and 0.87, respectively. Participants reported that all musical stimuli were unfamiliar.

Music Aesthetics Task and Measures

Based on previous studies, we modified the task to explore the effect of mindfulness on music aesthetics. Music aesthetic tasks include five items: recognition, experience, tension, beauty, and liking. Recognition was defined as emotions expressed by the music, while experience was defined as feelings felt by oneself (Gabrielsson, 2001; Eerola and Vuoskoski, 2011; Schubert, 2013). FCT was used to evaluate the between-group differences in the recognition and experience of music aesthetic emotion. Nine types of music aesthetic emotions were chosen from the GEMS (Zentner et al., 2008) to judge recognition and experience of multidimensional music aesthetic emotions using forced choice. GEMS is only used for multidimensional measurement of music aesthetic emotion, not for measuring emotional intensity. Based on subjective judgment of the participants, the evaluation dimension of recognition and experience could consist of multiple choices. All participants were instructed to rate the scores for tension (1 = *extremely relaxed*, 9 = *extremely tense*) and beauty (1 = *extremely ugly*, 9 = *extremely beautiful*); liking was rated on a scale of 1 (*extremely*) to 6 (*not at all*) in accordance with the preference of the participants. In order to ensure the ecology and integrity of music listening as much as possible, post-evaluation was conducted to assess the differences in MAEP.

To emphasize on the ecological validity of music listening, the temperature of the laboratory was controlled at 25°C, and the listening experiments were conducted individually for each participant in a soundproof room. E-Prime 3.0 was used to program the experiment and collect behavioral data. Fifteen music clips were presented in a pseudo-random manner to all participants, who listened to the excerpts through studio-quality headphones and were able to adjust the sound volume according to their own preferences. In the task (**Figure 1**), a fixation appeared for 800 ms after which the participants in the MMG were asked to practice mindfulness meditation using the audio material of temporary mindfulness meditation training, which took 10 min. At the end of the mindfulness meditation training, the participants in the MMG were presented with the following text on the screen: "Please keep the state of the mindfulness meditation as far as possible and listen to 15 music clips." The participants in both the MMG and the CG completed the same

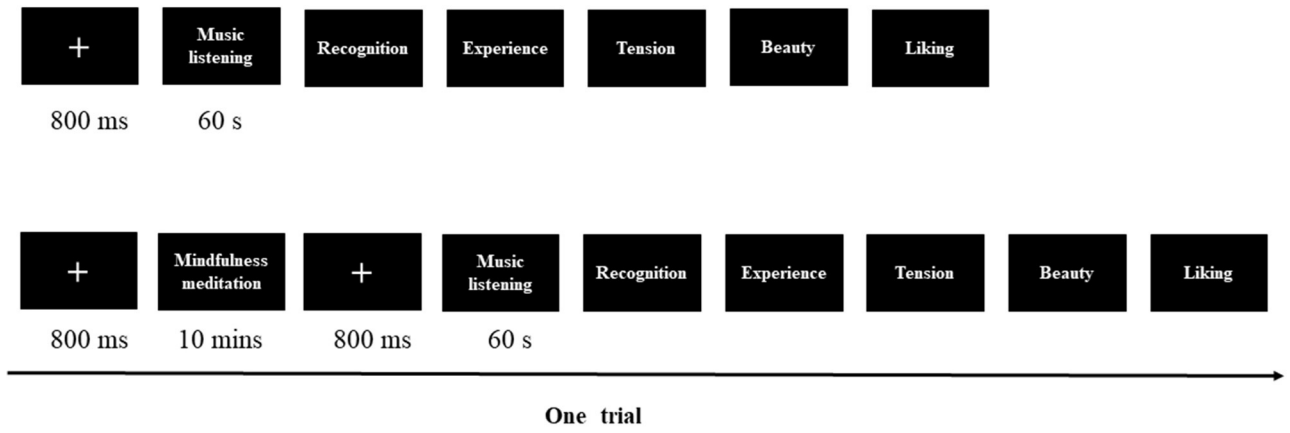

FIGURE 1 | An example of a music aesthetic task.

evaluation tasks (**Figure 1**). The experimental instructions were as follows: "There is no experimental task while listening to the music. After listening, please answer the 5-item questions according to the task requirements." During the task, participants were instructed to press the corresponding number button to report their evaluation results. The task consisted of 15 pieces of music and lasted about 20 min. After listening to the music, participants were requested to rate the scores of body awareness (1 = *very relaxed*, 9 = *extremely tense*) (Lutz et al., 2014; Wittmann and Schmidt, 2014) and time perception (1 = *extremely slow*, 9 = *extremely fast*) (Kramer et al., 2013; Wittmann and Schmidt, 2014). The experimental instructions for body awareness and time perception were as follows: "What is the degree of body control experienced while listening to the music?" and "What is your evaluation of the passage of musical time while listening to the music?"

Procedure

Participants were informed that the study was about music aesthetics and that they would perform tasks on a computer. After providing written consent, participants confirmed whether they had previously received training related to mindfulness meditation before filling out the PANAS (used to assess the current mood state of the participants). Participants then performed the music aesthetic tasks based on the requirements of the mindfulness meditation state, which paid attention to the present moment and emphasized the attainment of consciousness that is non-judgmental/accepting. Finally, participants performed the post-measurement of body awareness and time perception and answered the FFMQ (used to measure the mindfulness meditation state of the participants after all music stimuli were played).

Self-Report Measures

Five Facet Mindfulness Questionnaire

The Chinese version of the FFMQ, which was revised by Deng et al. (2011), has 39 items, covering five factors, namely, Observing (OB, e.g., "When walking, I will pay attention to the feeling of body parts on the move"), Describing (DS, e.g., "I am good at describing my emotions in words"), Acting with Awareness (AWA, e.g., "When I'm doing things, I'm often and easily distracted"), Non-judging of Inner Experience (NJ, e.g., "I blame myself for having irrational or inappropriate emotions"), and Non-reactive to Inner Experience (NR, e.g., "I feel my emotions and feelings, but I don't have to react to them"). The scale used a 5-point score from 1 (*not at all*) to 5 (*completely consistent*). The higher the scores, the higher the mindfulness levels. In this study, Cronbach's alpha for the FFMQ was 0.80.

Positive and Negative Affect Schedule

The PANAS (Watson and Clark, 1988) is a 20-item questionnaire that assesses the current mood state of the participants in terms of positive and negative effects. Participants rated the extent to which each of the 20 adjectives described their current feeling, on a 5-point scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Scores of the scale were totaled separately for the positive and the negative effects. As originally reported, Cronbach's alphas of positive affect ranged from 0.86 to 0.9, and Cronbach's alphas of negative affect ranged from 0.84 to 0.87 (Watson and Clark, 1988). In this study, positive affect had a Cronbach's alpha of 0.78, and the negative affect had a Cronbach's alpha of 0.73.

Study Design and Data Analysis

In the present experiment, a 2×3 mixed experimental design (2 groups: MMG and CG; 3 music emotions: calm music, happy music, and sad music) was used to verify our hypotheses. The between-subject design was used for the groups and the within-subject design was used for music emotion, which had three levels of music aesthetic emotion: calm, happy, and sad. All participants were randomly assigned to MMG or CG.

Independent-samples *t*-tests were used to explore the between-group differences in age, sex, PANAS, FFMQ, body awareness, and time perception (**Table 1**). In addition, a 2 × 3 repeated-measures ANOVA was conducted to examine the

TABLE 1 | Demographic information and self-report results of the participants.

Variable		MMG (M ± SD) $n = 33$	CG (M ± SD) $n = 34$	t
Age		20.3 (1.26)	19.9 (1.23)	
Sex		Male = 10, female = 23	Male = 12, female = 21	
PANAS		PA: 2.66 (0.53); NA: 1.66 (0.47)	PA: 2.63(0.50); NA: 1.65 (0.37)	PA: 0.22; NA: 0.13
FFMQ	Sum	119.00 (8.66)	119.08 (11.84)	0.04
	OB	3.07 (0.54)	3.14 (0.58)	0.49
	DS	3.00 (0.57)	3.06 (0.58)	0.42
	AWA	3.28 (0.63)	3.40 (0.59)	0.83
	NJ^{ms}	3.06 (0.43)	2.80 (0.64)	1.91
	NR	2.83 (0.36)	2.84 (0.52)	0.16
GEMS**		2.20 (0.51)	2.63 (0.68)	2.96
Body control*		5.42 (1.25)	6.33 (1.55)	2.61
Time perception*		5.94 (1.30)	5.24 (1.37)	2.16

Emotion levels		CM	HM	SM	CM	HM	SM	CM	HM	SM
MAT	Recognition*	2.33 (0.59)	2.27 (0.65)	2.36 (0.69)	2.76 (0.72)	2.64 (0.84)	2.63 (0.68)	2.68	2.00	1.62
	Experience**	2.11 (0.57)	1.98 (0.63)	2.14 (0.59)	2.71 (0.67)	2.51 (0.89)	2.56 (0.86)	3.89	2.82	2.30
	Tension	3.11 (1.12)	5.39 (1.31)	3.75 (1.20)	3.32 (1.20)	5.58 (1.00)	3.67 (1.20)	0.73	0.67	0.26
	Beauty**	6.08 (1.25)	5.45 (1.21)	5.34 (1.26)	6.34 (1.20)	5.36 (1.28)	5.25 (1.55)	0.86	0.30	0.27
	Liking	2.78 (0.56)	3.09 (0.56)	3.47 (0.64)	2.84 (0.54)	3.21 (0.75)	3.61 (0.76)	0.47	0.77	0.77

*MMG, mindfulness meditation group; CG, control group; M, mean; SD, standard deviation; PANAS, Positive and Negative Affect Scale (PA, Positive affect; NA, Negative affect); FFMQ, Five-Facet Mindfulness Questionnaire (OB, Observing; DS, Describing; AWA, Acting with Awareness; NJ, Non Judging of inner experience; NR, Non-Reactive to inner experience); GEMS, Geneva Emotional Music Scale; MAT, Music Aesthetics Task; CM, calm music; HM, happy music; SM, sad music; ms, significant marginally difference; *$p < 0.05$, **$p < 0.01$.*

between-group discrepancies and the main effect in the five-item tasks of MAEP, with group as a between-subject factor and emotion levels as a within-subject factor (**Table 1** and **Figure 2**). All the analyses were conducted using SPSS 22.0. The p-values were adjusted for sphericity using the Greenhouse–Geisser method. *Post-hoc t*-tests used Bonferroni adjustments for multiple comparisons.

RESULTS

Self-Reported Results

The demographic information and self-report results of the participants are shown in **Table 1** and **Figure 2**. An independent samples *t*-test found as follows: (1) The results of PANAS showed that there was no significant difference in the scores between the two groups ($p > 0.05$); (2) the post-test scores of body awareness showed that the scores of the MMG were lower than those of the CG ($t = 2.72$, $p = 0.008$, $d = 0.67$); (3) the post-test scores of musical time perception showed that the MMG experienced faster passage of time than the CG ($t = 2.16$, $p = 0.035$, $d = 0.54$); and (4) in the NJ scores, there was a significant but marginal difference between the two groups in the results of FFMQ ($t = 1.91$, $p = 0.06$, $d = 0.47$), but there was no significant difference in the scores of the other four items (OB, DS, AWA, and NR, $p > 0.05$).

Music Aesthetic Task Results

The behavioral results of MAEP of the participants at the three emotional levels are shown in **Figure 2**.

Emotion Recognition

A repeated-measures ANOVA on emotion recognition showed the main effect of group, $F_{(1, 65)} = 5.3$, $p = 0.02$, $\eta^2 = 0.08$. The *post-hoc t*-test showed that emotion recognition of all emotions when listening to music was lower among participants in the MMG than those in the CG. There was no main effect of music emotion levels and the interaction of group and music emotion levels (all $p > 0.05$).

Emotion Experience

A repeated-measures ANOVA on the emotion experience showed the main effect of group, $F_{(1, 65)} = 10.04$, $p = 0.002$, $\eta^2 = 0.13$. The *post-hoc t*-test showed that the emotional experiences of the participants in the MMG were lower than that in the CG when listening to music, in all emotions. Results also showed the main effect of the music emotion levels, $F_{(2, 64)} = 4.64$, $p = 0.01$, $\eta^2 = 0.07$. The *post-hoc t*-test showed that the emotional experiences while listening to calm music were significantly more than that during happy music, $p = 0.01$. The emotional experiences while listening to sad music were marginally more than that during happy music, $p = 0.07$. There was no difference between calm and sad music. There was no interaction of group and music emotion levels (all $p > 0.05$).

Relationship Emotion Recognition and Emotion Experience

Pearson correlation analysis showed that emotion recognition was related to emotion experience (sad music, $r = 0.64$, $p <$

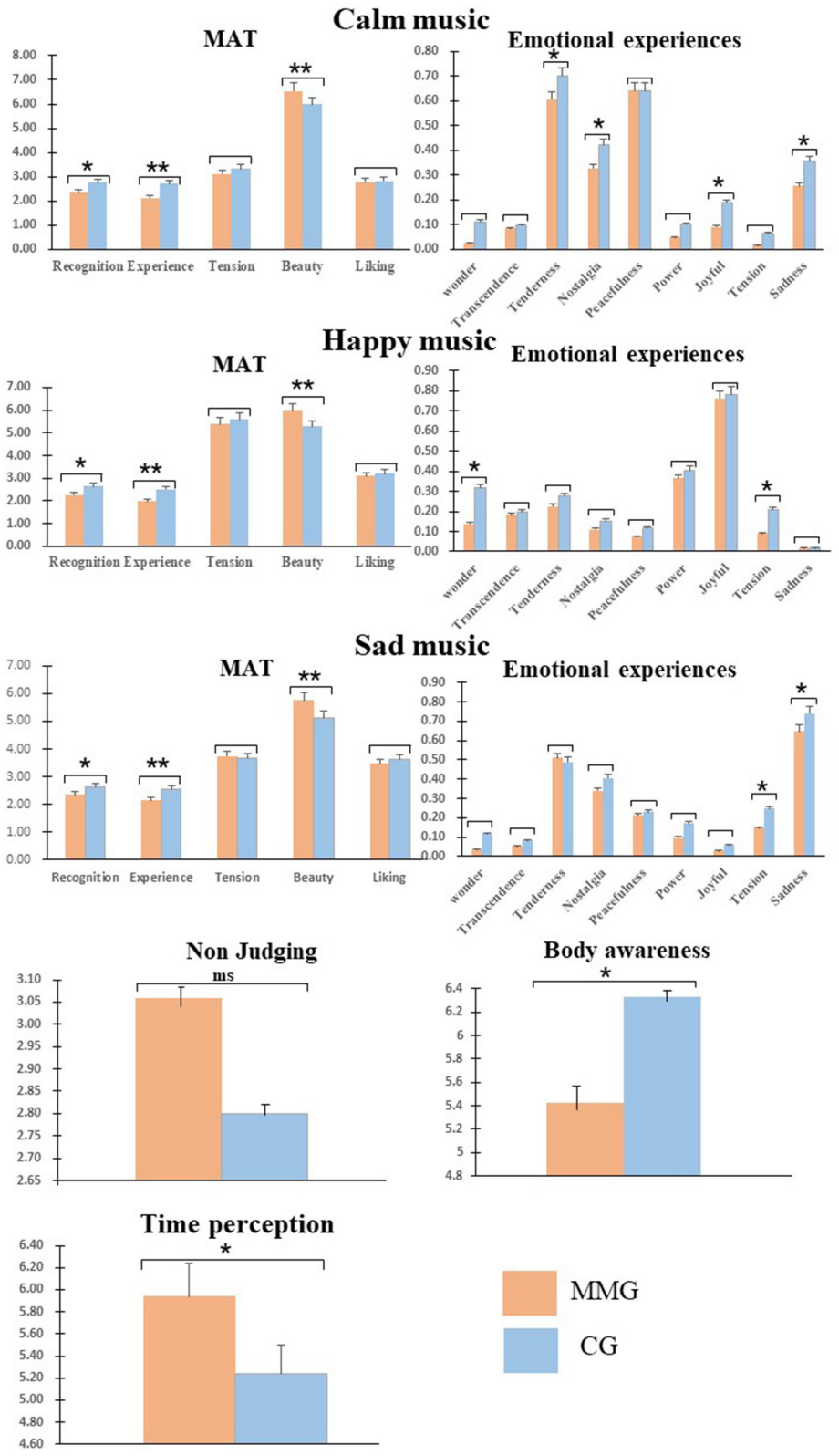

FIGURE 2 | Differences between MMG and CG in the musical aesthetic tasks of music with three emotional levels, non-judging, body awareness, and time perception. MMG, mindfulness meditation group; CG, control group; MAT, Music Aesthetics Task; ms, significant marginally difference; *$p < 0.05$, **$p < 0.01$.

0.001; calm music, $r = 0.77$, $p < 0.001$; happy music, $r = 0.76$, $p < 0.001$).

Tension

A repeated-measures ANOVA on tension showed the main effect of music emotion levels, $F_{(2, 64)} = 102.53$, $p < 0.001$, $\eta^2 = 0.61$, with ratings of tension in happy music > sad music > calm music. The score of happy music was significantly greater than that of sad music, and the score of sad music was significantly greater than that of calm music (all $p > 0.001$). There was no main effect of group and the interaction of group and music emotion levels (all $p > 0.05$).

Beauty

A repeated-measures ANOVA on beauty showed a main effect of the group, $F_{(1, 65)} = 8.35$, $p = 0.005$, $\eta^2 = 0.11$. The *post-hoc t*-test showed that participants rated the beauty of music significantly higher in the MMG than in the CG for all three music emotions (all $p < 0.05$). Results also showed the main effect of music emotion levels, $F_{(2, 64)} = 18.92$, $p < 0.001$, $\eta^2 = 0.37$, with ratings of beauty in calm music > happy music and sad music. Meanwhile, there was no difference between happy music and sad music (all $p < 0.05$). There was no main interaction of group and music emotion levels (all $p < 0.05$).

Liking

A repeated-measures ANOVA on liking showed the main effect of music emotion levels, $F_{(2, 64)} = 37.61$, $p < 0.001$, $\eta^2 = 0.37$, with ratings of liking in calm music > happy music > sad music. There was no main effect of group and interaction of group and music emotion levels (all $p > 0.05$).

DISCUSSION

In our novel examination of the influence of temporary mindfulness meditation training on MAEP, the hypotheses were partially confirmed. In line with our expectations, significant differences in recognition, experience, and beauty between the two groups were influenced by temporary mindfulness meditation training. Temporary mindfulness meditation decreased the negative emotions (e.g., tension, sadness in sad music) of happy and sad music and the positive emotions (e.g., wonder, tenderness, and joy) of calm music during recognition and experience and improved the experience of beauty in MAEP. The post-test results showed that maintaining a state of mindfulness enhanced body awareness and led to experiencing a faster passage of musical time while listening to music. Although there were no statistically significant between-group differences in tension and liking, the scores of all aesthetic dimensions in the MMG were lower than those in the CG, which suggested that temporary mindfulness meditation training might affect music aesthetic emotion. Additionally, the GEMS findings showed that Chinese classical folk instrumental musical works induced aesthetic emotions and produced multidimensional emotional experiences.

The behavioral results showed that the rating scores of emotion recognition, emotion experience, and evaluation of beauty and liking effectively measured the differences in the processing of music aesthetics in individuals with no musical training. Previous studies showed that temporary mindfulness meditation affected negative and positive emotion processing (Arch and Craske, 2006; Erisman and Roemer, 2010; Lalot et al., 2014; Lei et al., 2016). Erisman and Roemer (2010) found that temporary mindfulness meditation intervention effectively enhanced positive experience and reduced negative experience using the stimuli with three emotions (sad, positive, and mixed) (Erisman and Roemer, 2010). However, a few studies also investigated the effect of mindful attention on positive emotions using positive stimuli; their results showed that participants without previous mindfulness training reported lesser positive emotions (Arch and Craske, 2006; Lalot et al., 2014). Consistent with previous studies (Arch and Craske, 2006; Erisman and Roemer, 2010; Lalot et al., 2014), the MMG showed an effectively decreased music aesthetic emotion during recognition and experience as well as a decrease in the negative emotional experiences of happy and sad music. Compared with the MMG, the CG reported more positive emotional experiences (e.g., wonder, tenderness, and joy) in the emotional experiences of calm music. This may be due to the non-judgment of the inner experiences induced by temporal mindfulness meditation (Lei et al., 2016; Hernandez-Ruiz and Dvorak, 2020); the non-judging of inner experience refers to taking a non-evaluative stance toward thoughts and feelings (Baer et al., 2008). In previous studies, mindfulness meditation, as an effective form of regulating the body and mind and promoting health, had a significantly positive effect on regulating negative emotions, attention, emotional stability, awareness, and empathy experience (Erisman and Roemer, 2010; Tan et al., 2014; Bueno et al., 2015; Clark et al., 2015; Lei et al., 2016; Ren et al., 2018; Andreu et al., 2019; Bailey et al., 2019). Temporary mindfulness meditation training influenced aesthetic emotion recognition and experience and enhanced the experiences of musical beauty in individuals with no musical training, which is consistent with a few previous research (Bueno et al., 2015; Sayers et al., 2015; Lei et al., 2016). Temporary mindfulness meditation training, as a relaxed state of listening to music, provides us with a new method of listening and helps us to experience music in depth and generate aesthetic judgments.

Our results showed that emotion recognition was related to emotion experience. When exposed to musical aesthetics, the processing of the aesthetic emotions of individuals is affected by emotional experience, aesthetic judgment, and aesthetic preferences (Schubert, 2007; Barrett et al., 2010; Nieminen et al., 2012; Brattico et al., 2013; Lee et al., 2013; Orozco, 2015). Previous studies have found more similarities than differences between emotion recognition and experience, which are seen as a continuum (Gabrielsson, 2001; Eerola and Vuoskoski, 2011; Schubert, 2013) and which have an important influence on the judgment of music aesthetics (Eerola and Vuoskoski, 2011; Swaminathan and Schellenberg, 2015; Scherer et al., 2019). Previous studies have also shown that individuals could empathize with music and produce an individualized aesthetic experience by actively participating in music or by being deeply attracted to music. Therefore, emotion experience is more

important than emotion recognition in music aesthetics (Madsen et al., 1993; Brattico et al., 2009; Paul, 2009; Menninghaus et al., 2019; Schubert and North, 2020). However, in the judgment of music emotion, perception and evaluation of music emotion of individuals are affected by subjective experience, which has a direct impact on music aesthetic judgment (Schubert, 2007; Kumar and Garg, 2010; Droit-Volet et al., 2013). In music aesthetics, recognition and experience of music aesthetic emotion are both independent and mutually influential (Gabrielsson, 2001; Schubert, 2007, 2013; Schindler et al., 2017).

In addition, tension, beauty, and liking are also important measurement dimensions of music aesthetic processing (Brattico et al., 2009, 2017; Schindler et al., 2017; Menninghaus et al., 2019; Cowen et al., 2020). Previous studies have shown that tension, emotional intensity, and activation are different measurement dimensions of subjective feelings (Zentner et al., 2008; Zentner, 2010; Menninghaus et al., 2019). This study explored how individuals with no musical training experienced a change from tension to relaxation induced by calm, happiness, and sadness in a state of mindfulness meditation. Some studies also showed that mindfulness meditation can effectively promote relaxation in individuals (Bueno et al., 2015; Tang et al., 2015; Lei et al., 2016; Bailey et al., 2019). Therefore, this study chose tension as the measurement index of relaxation and emotional intensity. Although there is no significant difference in the tension between groups, the score of tension in the MMG is slightly lower than that in the CG, which indicated that a single session of mindfulness training is not enough to promote the relaxation of aesthetic emotional experience. Further study using short-term mindfulness meditation training on tension is needed. Beauty is influenced by the interaction between an individual and music, which reflects the self-evaluation of an individual of the beauty and ugliness of the musical stimulation and affects, or even determines, the liking for music aesthetics of an individual (Reber et al., 2004; Nieminen et al., 2012; Schubert and North, 2020). Our results showed that temporary mindfulness meditation training contributes to improving the aesthetic experience of the participants in MAEP, which indicates that individuals could experience more beauty by listening to music in a relaxed physical state. Liking is influenced by the music preference and personality traits of an individual (Brattico et al., 2016; Menninghaus et al., 2019), as well as by the quality of the music and the listening environment (Schellenberg et al., 2008; Brattico et al., 2013). This experiment was conducted in a quiet, soundproof room, stimulated by traditional Chinese folk music with high ecological quality, and played with high-quality audio equipment. The results showed that there was no significant difference in liking between groups, which may be due to the influence of music preference and personality traits of individuals (Brattico and Pearce, 2013; Menninghaus et al., 2019).

Previous studies showed that individuals could maintain a state of mind and body that focused on the present moment and could be open to more positive experiences while maintaining a state of inner experience without judgment (Clark et al., 2015; Sayers et al., 2015; Lei et al., 2016). Our results showed that, compared with the CG, the MMG maintained a more relaxed awareness of body control and experienced a faster passage of the musical time while listening to music. The reduction in body control in the MMG may reflect maintaining a relaxed state while listening to music (Diaz, 2013; Rodríguez-Carvajal and Lecuona, 2014). This may be related to the relaxation and positive emotional experiences induced by mindfulness meditation (Rodríguez-Carvajal and Lecuona, 2014; Hernandez-Ruiz and Dvorak, 2020). Furthermore, some studies showed that time perception is intimately linked to affective states, which might alter the sense of time (Droit-Volet et al., 2013; Kramer et al., 2013; Wittmann and Schmidt, 2014). The faster time perception of music in the MMG may be due to moment-to-moment awareness in the positive emotional experience (Diaz, 2013; Droit-Volet et al., 2013; Rodríguez-Carvajal and Lecuona, 2014).

The following evidence confirms our hypothesis: Chinese classical folk instrumental musical works, which are consistent with Western classical music (Laukka and Juslin, 2007; Paul, 2009; Larsen and Stastny, 2011; Trost et al., 2012; Brattico et al., 2013; Eerola and Vuoskoski, 2013; Juslin et al., 2013; Madsen et al., 2019), effectively induce aesthetic emotion and produce two or more aesthetic emotion experiences among non-musically trained adults. Consistent with the previous findings regarding music aesthetics, this study selected three emotional levels of calm, happiness, and sadness with Chinese classical folk instrumental musical works as stimulus materials. Participants were not familiar with the materials used in this study. Previous studies have found that listening to negative emotional music induced by anger and fear for a long time may have a negative effect on the experience of individuals and may even produce a sense of disgust and a negative effect on the music aesthetics of individuals (Zentner et al., 2008; Zentner, 2010). By contrast, sad music based on personal mood and preference can generate positive effects (Brattico et al., 2016; Schubert, 2016; Garrido, 2017; Eerola et al., 2018). This study showed the following: (1) in terms of experience, the dimension of calm music was significantly greater than happy music, the dimension of happy music was marginally smaller than that of sad music, and there was no difference between calm music and sad music; (2) in terms of tension, the effect of calm music was significantly lower than sad music and happy music, and sad music was significantly lower than happy music; (3) in the assessment of beauty, there were noteworthy discrepancies in the three emotion levels, namely, calm music was higher than happy music and sad music, while happy music was slightly higher than sad music; and (4) in ratings of liking, calm music was higher than happy music and sad music, happy music was higher than sad music, and sad music was rated as "not very liked." According to the mood congruence theory (Lee et al., 2013), liking of sad music might be affected by the positive mood of the participants, which indicates that one-off temporary mindfulness meditation training is not sufficient to have an impact on their preference.

CONCLUSION

To our knowledge, this is the first study investigating the influence of mindfulness on MAEP in individuals with no

musical training. The findings contribute to existing literature by identifying the relationship between mindfulness and musically induced emotion. Importantly, this study provided new evidence of the aesthetic responses and new insights into the association between recognition and experience of aesthetic emotion based on Chinese classical folk instrumental musical works. Some limitations of this study has been discussed. First, the sample size was comparatively small for a behavioral study. Future studies should consider larger samples to further explore the MAEP in individuals who have no musical training. Second, this study was based on individuals who had no musical training. Future studies should investigate how mindfulness meditation affects the aesthetic emotion processing of musicians. Third, we relied on self-reports, which could not provide an objective index. As such, future studies should explore neural markers or brain activities using event-related potential (ERP) or functional magnetic resonance imaging (fMRI). Finally, future research needs to explore the influence of individual music preference and different personality traits on music aesthetic processing based on temporary mindfulness meditation, and, further, provide relevant behavioral and neurophysiological evidence. As some researchers expect, future research on the medium- and long-term effects of aesthetic experience on physical and mental health, well-being, and cognitive function may benefit from regarding aesthetic emotion as an important variable. Music could thus certainly offer highly effective and pleasurable tools to further promote well-being and health (Vuilleumier and Trost, 2015; Lynch and Wilson, 2017; Sorensen et al., 2018; Menninghaus et al., 2019). In the future, in-depth research on the effects of mindfulness meditation training on aesthetic emotion will be conducive to a better understanding of the functioning and cultivation of a healthy mind (Hölzel et al., 2011b; Bueno et al., 2015; Loo et al., 2020; Misba et al., 2020).

In conclusion, the findings of this study suggest, that whether during the recognition or the experience process, music emotions are multidimensional. Temporary mindfulness meditation decreases negative emotional experiences of happy and sad music and positive emotional experiences of calm music and promotes beautiful musical experiences in individuals with no musical training. Maintaining a state of mindfulness may enhance body awareness and lead to experiencing faster passage of musical time while listening to music. Mindfulness meditation, as a positive state of listening to music, provides a new avenue by which the beauty of music could be enjoyed. This is the first study exploring the effect of mindfulness on MAEP and provides new directions for the further studies of musical aesthetics.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Project Ethical Review Application Form, Faculty of Psychology, Southwest University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

XL, YL, and HS conceptualized and designed this study and wrote the manuscript. MZ reviewed the manuscript. All authors have read and agreed to the published version of the manuscript.

FUNDING

This work was supported by the Fundamental Research Funds for the Central Universities (SWU1709123; SWU1809350), the Science and Technology Research Program of Chongqing Municipal Education Commission (Grant No. KJZD-K202002301), and the Humanities and Social Sciences program of Chongqing Municipal Education Commission (Grant No. SKGH295).

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.648062/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

REVIEW
published: 12 August 2021
doi: 10.3389/fpsyg.2021.686005

Art Therapy: A Complementary Treatment for Mental Disorders

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Art therapy, as a non-pharmacological medical complementary and alternative therapy, has been used as one of medical interventions with good clinical effects on mental disorders. However, systematically reviewed in detail in clinical situations is lacking. Here, we searched on PubMed for art therapy in an attempt to explore its theoretical basis, clinical applications, and future perspectives to summary its global pictures. Since drawings and paintings have been historically recognized as a useful part of therapeutic processes in art therapy, we focused on studies of art therapy which mainly includes painting and drawing as media. As a result, a total of 413 literature were identified. After carefully reading full articles, we found that art therapy has been gradually and successfully used for patients with mental disorders with positive outcomes, mainly reducing suffering from mental symptoms. These disorders mainly include depression disorders and anxiety, cognitive impairment and dementias, Alzheimer's disease, schizophrenia, and autism. These findings suggest that art therapy can not only be served as an useful therapeutic method to assist patients to open up and share their feelings, views, and experiences, but also as an auxiliary treatment for diagnosing diseases to help medical specialists obtain complementary information different from conventional tests. We humbly believe that art therapy has great potential in clinical applications on mental disorders to be further explored.

Keywords: painting, art therapy, mental disorders, clinical applications, medical interventions

OPEN ACCESS

Edited by:
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Reviewed by:
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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *26 March 2021*
Accepted: *28 July 2021*
Published: *12 August 2021*

Citation:
Hu J, Zhang J, Hu L, Yu H and Xu J (2021) Art Therapy: A Complementary Treatment for Mental Disorders. Front. Psychol. 12:686005. doi: 10.3389/fpsyg.2021.686005

INTRODUCTION

Mental disorders constitute a huge social and economic burden for health care systems worldwide (Zschucke et al., 2013; Kenbubpha et al., 2018). In China, the lifetime prevalence of mental disorders was 24.20%, and 1-month prevalence of mental disorders was 14.27% (Xu et al., 2017). The situation is more severely in other countries, especially for developing ones. Given the large numbers of people in need and the humanitarian imperative to reduce suffering, there is an urgent need to implement scalable mental health interventions to address this burden. While pharmacological treatment is the first choice for mental disorders to alleviate the major symptoms, many antipsychotics contribute to poor quality of life and debilitating adverse effects. Therefore, clinicians have turned toward to complementary treatments, such as art therapy in addressing the health needs of patients more than half a century ago.

Art therapy, is defined by the British Association of Art Therapists as: "a form of psychotherapy that uses art media as its primary mode of expression and communication. Clients referred to

art therapists are not required to have experience or skills in the arts. The art therapist's primary concern is not to make an esthetic or diagnostic assessment of the client's image. The overall goal of its practitioners is to enable clients to change and grow on a personal level through the use of artistic materials in a safe and convenient environment" (British Association of Art Therapists, 2015), whereas as: "an integrative mental health and human services profession that enriches the lives of individuals, families, and communities through active art-making, creative process, applied psychological theory, and human experience within a psycho-therapeutic relationship" (American Art Therapy Association, 2018) according to the American Art Association. It has gradually become a well-known form of spiritual support and complementary therapy (Faller and Schmidt, 2004; Nainis et al., 2006). During the therapy, art therapists can utilize many different art materials as media (i.e., visual art, painting, drawing, music, dance, drama, and writing) (Deshmukh et al., 2018; Chiang et al., 2019). Among them, drawings and paintings have been historically recognized as the most useful part of therapeutic processes within psychiatric and psychological specialties (British Association of Art Therapists, 2015). Moreover, many other art forms gradually fall under the prevue of their own professions (e.g., music therapy, dance/movement therapy, and drama therapy) (Deshmukh et al., 2018). Thus, we excluded these studies and only focused on studies of art therapy which mainly includes painting and drawing as media. Specifically, it focuses on capturing psychodynamic processes by means of "inner pictures," which become visible by the creative process (Steinbauer et al., 1999). These pictures reflect the psychopathology of different psychiatric disorders and even their corresponding therapeutic process based on specific rules and criterion (Steinbauer and Taucher, 2001). It has been gradually recognized and used as an alternative treatment for therapeutic processes within psychiatric and psychological specialties, as well as medical and neurology-based scientific audiences (Burton, 2009).

The development of art therapy comes partly from the artistic expression of the belief in unspoken things, and partly from the clinical work of art therapists in the medical setting with various groups of patients (Malchiodi, 2013). It is defined as the application of artistic expressions and images to individuals who are physically ill, undergoing invasive medical procedures, such as surgery or chemotherapy for clinical usage (Bar-Sela et al., 2007; Forzoni et al., 2010; Liebmann and Weston, 2015). The American Art Therapy Association describes its main functions as improving cognitive and sensorimotor functions, fostering self-esteem and self-awareness, cultivating emotional resilience, promoting insight, enhancing social skills, reducing and resolving conflicts and distress, and promoting societal and ecological changes (American Art Therapy Association, 2018).

However, despite the above advantages, published systematically review on this topic is lacking. Therefore, this review aims to explore its clinical applications and future perspectives to summary its global pictures, so as to provide more clinical treatment options and research directions for therapists and researchers.

PUBLICATIONS OF ART THERAPY

The literatures about "art therapy" published from January 2006 to December 2020 were searched in the PubMed database. The following topics were used: Title/Abstract = "art therapy," Indexes Timespan = 2006–2020.

A total of 652 records were found. Then, we manually screened out the literatures that contained the word "art" but was not relevant with the subject of this study, such as state of the art therapy, antiretroviral therapy (ART), and assisted reproductive technology (ART). Finally, 479 records about art therapy were identified. Since we aimed to focus on art therapy included painting and drawing as major media, we screened out literatures deeper, and identified 413 (84%) literatures involved in painting and drawing (**Figure 1**).

As we can see, the number of literature about art therapy is increasing slowly in the last 15 years, reaching a peak in 2020. This indicates that more effort was made on this topic in recent years (**Figure 1**).

OVERVIEW OF ART THERAPY

As defined by the British Association of Art Therapists, art therapy is a form of psychotherapy that uses art media as its primary mode of communication. Based on above literature, several highlights need to be summarized. (1) The main media of art therapy include painting, drawing, music, drama, dance, drama, and writing (Chiang et al., 2019). (2) Main contents of painting and drawing include blind drawing, spiral drawing, drawing moods and self-portraits (Legrand et al., 2017; Abbing et al., 2018; Papangelo et al., 2020). (3) Art therapy is mainly used for cancer, depression and anxiety, autism, dementia and cognitive impairment, as these patients are reluctant to express themselves in words (Attard and Larkin, 2016; Deshmukh et al., 2018; Chiang et al., 2019). It plays an important role in facilitating engagement when direct verbal interaction becomes difficult, and provides a safe and indirect way to connect oneself with others (Papangelo et al., 2020). Moreover, we found that art therapy has been gradually and successfully used for patients with mental disorders with positive outcomes, mainly reducing suffering from mental symptoms. These findings suggest that art therapy can not only be served as an useful therapeutic method to assist patients to open up and share their feelings, views, and experiences, but also as an auxiliary treatment for diagnosing diseases to help medical specialists obtain complementary information different from conventional tests.

ART THERAPY FOR MENTAL DISORDERS

Based on the 413 searched literatures, we further limited them to mental disorders using the following key words, respectively: Depression OR anxiety OR Cognitive impairment OR dementia OR Alzheimer's disease OR Autism OR Schizophrenia OR mental disorder. As a result, a total of 23 studies (5%) (**Table 1**) were

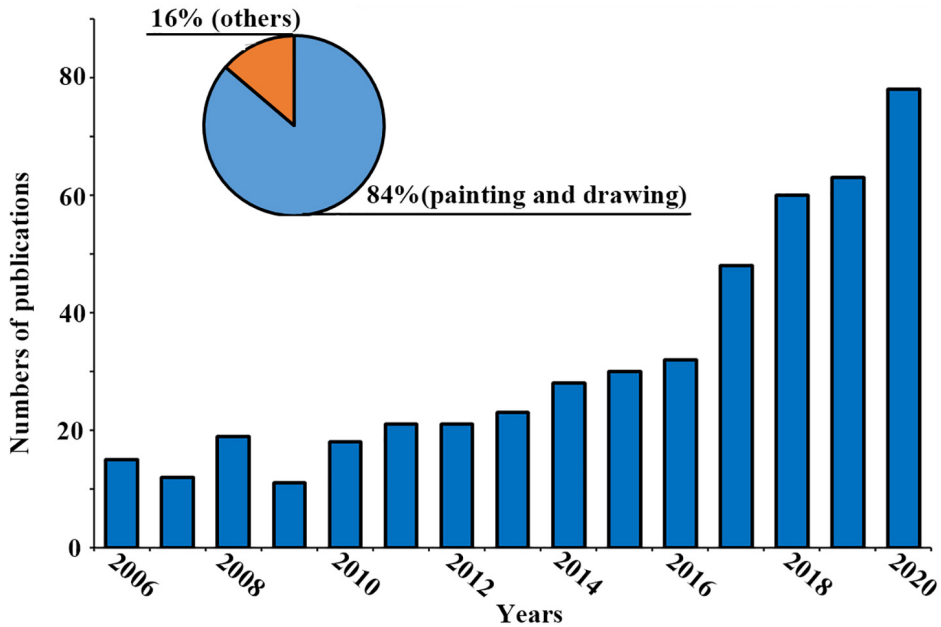

FIGURE 1 | Number of publications about art therapy.

included and classified after reading the abstract and the full text carefully. These studies include 9 articles on depression and anxiety, 4 articles on cognitive impairment and dementia, 3 articles on Alzheimer's disease, 3 articles on autism, and 4 articles on schizophrenia. In addition to the English literature, in fact, some Chinese literatures also described the application of art therapy in mental diseases, which were not listed but referred to in the following specific literatures.

Depression Disorders and Anxiety

Depression and anxiety disorders are highly prevalent, affecting individuals, their families and the individual's role in society (Birgitta et al., 2018). Depression is a disabling and costly condition associated with a significant reduction in quality of life, medical comorbidities and mortality (Demyttenaere et al., 2004; Whiteford et al., 2013; Cuijpers et al., 2014). Anxiety is associated with lower quality of life and negative effects on psychosocial functioning (Cramer et al., 2005). Medication is the most commonly used effective way to relieve symptoms of depression and anxiety. However, nonadherence are crucial shortcomings in using antidepressant to treat depression and anxiety (van Geffen et al., 2007; Nielsen et al., 2019).

In recent years, many studies have shown that art therapy plays a significant role in alleviating depression symptoms and anxiety. Gussak (2007) performed an observational survey about populations in prison of northern Florida and identified that art therapy significantly reduces depressive symptoms. Similarly, a randomized, controlled, and single-blind study about art therapy for depression with the elderly showed that painting as an adjuvant treatment for depression can reduce depressive and anxiety symptoms (Ciasca et al., 2018). In addition, art therapy is also widely used among students, and several studies (Runde, 2008; Zhenhai and Yunhua, 2011) have shown that art therapy also significantly reduces depressive symptoms in students. For example, Wang et al. (2011) conducted group painting therapy on 30 patients with depression for 3 months, and found that painting therapy could promote their social function recovery, improve their social adaptability and quality of life. Another randomized clinical trial also showed that it could decrease mean anxiety scores in the 3–12 year painting group (Forouzandeh et al., 2020).

Studies have shown that distress, including anxiety and depression, is related to poorer health-related quality of life and satisfaction to medical services (Hamer et al., 2009). Painting can be employed to express patients' anxiety and fear, vent negative emotions by applying projection, thereby significantly improve the mood and reduce symptoms of depression and anxiety of cancer patients. A number of studies (Bar-Sela et al., 2007; Thyme et al., 2009; Lin et al., 2012; Abdulah and Abdulla, 2018) showed that art therapy for cancer patients could enhance the vitality of patients and participation in social activities, significantly reduce depression, anxiety, and reduce stressful feelings. Importantly, even in the follow-up period, art therapy still has a lasting effect on cancer patients (Thyme et al., 2009). Interestingly, art therapy based on famous painting appreciation could also significantly reduce anxiety and depression associated with cancer (Lee et al., 2017). Among cancer patients treated in outpatient health care, art therapy also plays an important role in alleviating their physical symptoms and mental health (Götze et al., 2009). Therefore, art therapy as an auxiliary treatment of cancer is of great value in improving quality of life.

Overall, art painting therapy permits patients to express themselves in a manner acceptable to the inside and outside culture, thereby diminishing depressed and anxiety symptoms.

TABLE 1 | Studies of art therapy in mental diseases.

Type of diseases/ author and year	Country	Number (painting)	Treatment	Subjects	Main results
Depression and anxiety					
Bar-Sela et al., 2007	Israel	19/41	once-weekly, 4w/2w	Cancer patients with depression and anxiety	In the intervention group, the median Hospital Anxiety and Depression Scale score for depression was 9 at the beginning and 7 after the fourth appointment.
Gussak, 2007	Unite States American	48	4-week period, two group sessions per week	Depression	The results reflected a significant decrease in depressive symptoms in those inmates who participated in the program.
Geue et al., 2013	Germany	54	22 sessions	Cancer patients with psychological distress	Anxiety scores decreased in a pre–post comparison.
Crone et al., 2013	United Kingdom	202	10-week intervention	Patients with anxiety, depression, or stress	There was a significant improvement in well-being.
Montag et al., 2014	Germany	58	12 twice-weekly sessions	Acute psychotic episodes with depression	Patients in the ART group showed significant improvement in levels of emotional awareness.
Armstrong and Howatson, 2015	United Kingdom	6 mothers/ 8 infants	12 consecutive weeks	Postpartum depression	The responses of the questionnaires were more positive after the intervention, and 8 of the 10 mothers showed an improvement in postpartum depression and in the relationship with their children.
Lefèvre et al., 2016	France	28	63 art therapy sessions, 1 h/session	Cancer patients with depression and anxiety	There was a significant reduction in all of the symptoms: pain, anxiety, evil, fatigue, sadness, and depression.
Ciasca et al., 2018	Brazil	31/25	20 weekly art therapy sessions (90 min/session)	Depression	Art therapy as an adjunctive treatment for MDD in the elderly can improve depressive and anxiety symptoms.
Forouzandeh et al., 2020	Iran	55	NA	Anxiety	Nurses should collaborate with medical teams to routinely use non-pharmacological methods such as the painting and the interactive games to alleviate preoperative anxiety in children.
Cognitive impairment, and dementia					
Rusted et al., 2016	United Kingdom	45	1 h each week for 40 successive weeks	Dementia	Art therapy is beneficial and appropriate interventions for older people with dementia.
Pike, 2013	Unite States American	91	10-week art therapy	Cognitive impairment	Art therapy treatment was associated with significantly improved cognitive performance.
Heymann et al., 2018	Germany	32	analysis of tree drawings on a digitizing tablet	Mild cognitive impairment (MCI)	MCI group shows a higher recognition rate.
Yu et al., 2021	Singapore	22	weekly 45-min sessions were carried out across 3 months.	MCI	Significant gains in immediate memory and working memory span were observed.
Alzheimer's disease					
Witkoski and Chaves, 2007	Brazil	11	31 months	Alzheimer's disease	The selection of drawing or modeling showed significant association with severity of cognitive deficit.
Mimica and Kaliniæ, 2011	Croatia	1 case report	not available	Alzheimer's disease	The art therapy was shown to be an excellent add-on non-pharmacological intervention, beneficial for reducing stress-related behaviors.
Hattori et al., 2011	Japan	39	once weekly for 12 weeks	Alzheimer's disease	Significant improvement in the quality of life was observed in the art therapy
Autism					
Low et al., 2009	New Zealand	27	four 0.5 to 1 h sessions that were approximately 1 week apart	Autism	There is an important relationship between generativity and imagination.

(Continued)

TABLE 1 | Continued

Type of diseases/ author and year	Country	Number (painting)	Treatment	Subjects	Main results
Ten and Muller, 2018	Canada	22	1.5-h session	Autism	There are changes in the type of cognitive processes involved in imagination and children with autism employ a unique cognitive strategy in imaginative drawing.
Jalambadani, 2020	Iran	48	12 sessions	Autism	Autistic children showed more adaptive behaviors and emotions.
Schizophrenia					
Richardson et al., 2009	United Kingdom	43	12 weekly sessions of one and a half hours	Schizophrenia	Art therapy produced a statistically significant positive effect on negative symptoms.
Teglbjaerg, 2011	Denmark	5	2 h a week	Schizophrenia	The positive effect of art therapy is mainly due to a strengthening of the Schizophrenia' minimal sense of self.
Mannheim et al., 2013	Serbian	2	once a week, two months	Schizophrenia	The patient's drawings show clinical improvement from the reduction of depressive themes and an increase in the frequency of human figure drawings and self-confidence.
Tong et al., 2020	China	104	90 min for a total of 30 times in 15 weeks	Schizophrenia	Group art therapy can improve self-efficacy and social function, reducing social and life function problems, and promote the recovery of individuals diagnosed with schizophrenia.

Cognitive Impairment, and Dementia

Dementia, a progressive clinical syndrome, is characterized by widespread cognitive impairment in memory, thinking, behavior, emotion and performance, leading to worse daily living (Deshmukh et al., 2018). According to the Alzheimer's Disease International 2015, there is 46.8 million people suffered from dementia, and numbers almost doubling every 20 years, rising to 131.5 million by 2050. Although art therapy has been used as an alternative treatment for the dementia for long time, the positive effects of painting therapy on cognitive function remain largely unknown. One intervention assigned older adults patients with dementia to a group-based art therapy (including painting) observed significant improvements in the clock drawing test (Pike, 2013), whereas two other randomized controlled trials (Hattori et al., 2011; Rusted et al., 2016) on patients with dementia have failed to obtain significant cognitive improvement in the painting group. Moreover, a cochrane systematic review (Deshmukh et al., 2018) included two clinical studies of art therapy for dementia revealed that there is no sufficient evidence about the efficacy of art therapy for dementia. This may be because patients with severely cognitive impairment, who was unable to accurately remember or assess their own behavior or mental state, might lose the ability to enjoy the benefits of art therapy.

In summary, we should intervene earlier in patients with mild cognitive impairment, an intermediate stage between normal aging and dementia, in order to prevent further transformation into dementia. To date, mild cognitive impairment is drawing much attention to the importance of painting intervening at this stage in order to alter the course of subsequent cognitive decline as soon as possible (Petersen et al., 2014). Recently, a randomized controlled trial (Yu et al., 2021) showed significant relationship between improvement immediate memory/working memory span and increased cortical thickness in right middle frontal gyrus in the painting art group. With the long-term cognitive stimulation and engagement from multiple sessions of painting therapy, it is likely that painting therapy could lead to enhanced cognitive functioning for these patients.

Alzheimer's Disease

Alzheimer's disease (AD) is a sub-type of dementia, which is usually associated with chronic pain. Previous studies suggested that art therapy could be used as a complementary treatment to relief pain for these patients since medication might induce severely side effects. In a multicenter randomized controlled trial, 28 mild AD patients showed significant pain reduction, reduced anxiety, improved quality of life, improved digit span, and inhibitory processes, as well as reduced depression symptoms after 12-week painting (Pongan et al., 2017; Alvarenga et al., 2018). Further study also suggested that individual therapy rather than group therapy could be more optimal since neuroticism can decrease efficacy of painting intervention on pain in patients with mild AD. In addition to release chronic pain, art therapy has been reported to show positive effects on cognitive and psychological symptoms in patients with mild AD. For example, a controlled study revealed significant improvement in the apathy scale and

quality of life after 12 weeks of painting treatment mainly including color abstract patterns with pastel crayons or water-based paint (Hattori et al., 2011). Another study also revealed that AD patients showed improvement in facial expression, discourse content and mood after 3-weeks painting intervention (Narme et al., 2012).

Schizophrenia

Schizophrenia is a complex functional psychotic mental illness that affects about 1% of the population at some point in their life (Kolliakou et al., 2011). Not only do sufferers experience "positive" symptoms such as hallucinations, delusions, but also experience negative symptoms such as varying degrees of anhedonia and asociality, impaired working memory and attention, poverty of speech, and lack of motivation (Andreasen and Olsen, 1982). Many patients with schizophrenia remain symptomatic despite pharmacotherapy, and even attempts to suicide with a rate of 10 to 50% (De Sousa et al., 2020). For these patients, art therapy is highly recommended to process emotional, cognitive and psychotic experiences to release symptoms. Indeed, many forms of art therapy have been successfully used in schizophrenia, whether and how painting may interfere with psychopathology to release symptoms remains largely unknown.

A recent review including 20 studies overall was performed to summary findings, however, concluded that it is not clear whether art therapy leads to clinical improvement in schizophrenia with low (Ruiz et al., 2017). Anyway, many randomized clinical trials reported positive outcomes. For example, Richardson et al. (2007) conducted painting therapy for six months in patients with chronic schizophrenia and found that art therapy had a positive effect on negative symptoms. Teglbjaerg (2011) examined experience of each patient using interviews and written evaluations before and after painting therapy and at a 1-year follow-up and found that group painting therapy in patients with schizophrenia could not only reduce psychotic symptoms, but also boost self-esteem and improve social function.

What's more, the characteristics of the painting can also be used to judge the health condition in patients with schizophrenia. For example, Hongxia et al. (2013) explored the correlation between psychological health condition and characteristics of House-Tree-Person tests for patients with schizophrenia, and showed that the detail characteristic of the test results can be used to judge the patient's anxiety, depression, and obsessive-compulsive symptoms.

Most importantly, several other studies showed that drug plus painting therapy significantly enhanced patient compliance and self-cognition than drug therapy alone in patients with schizophrenia (Hongyan and JinJie, 2010; Min, 2010).

Autism

Autism spectrum disorder (ASD) is a heterogeneous neurodevelopmental syndrome with no unified pathological or neurobiological etiology, which is characterized by difficulties in social interaction, communication problems, and a tendency to engage in repetitive behaviors (Geschwind and Levitt, 2007).

Art therapy is a form of expression that opens the door to communication without verbal interaction. It provides therapists with the opportunity to interact one-on-one with individuals with autism, and make broad connections in a more comfortable and effective way (Babaei et al., 2020). Emery (2004) did a case study about a 6-year-old boy diagnosed with autism and found that art therapy is of great value to the development, growth and communication skills of the boy. Recently, one study (Jalambadani, 2020) using 40 children with ASD participating in painting therapy showed that painting therapy had a significant improvement in the social interactions, adaptive behaviors and emotions. Therefore, encouraging children with ASD to express their experience by using nonverbal expressions is crucial to their development. Evans and Dubowski (2001) believed that creating images on paper could help children express their internal images, thereby enhance their imagination and abstract thinking. Painting can also help autistic children express and vent negative emotions and thereby bring positive emotional experience and promote their self-consciousness (Martin, 2009). According to two studies (Wen and Zhaoming, 2009; Jianhua and Xiaolu, 2013) in China, Art therapy could also improve the language and communication skills, cognitive and behavioral performance of children with ASD.

Moreover, art therapy could be used to investigate the relationship between cognitive processes and imagination in children with ASD. One study (Wen and Zhaoming, 2009; Jianhua and Xiaolu, 2013) suggested that children with ASD apply a unique cognitive strategy in imaginative drawing. Another study (Low et al., 2009) examined the cognitive underpinnings of spontaneous imagination in children with ASD and showed that ASD group lacks imagination, generative ability, planning ability and good consistency in their drawings. In addition, several studies (Leevers and Harris, 1998; Craig and Baron-Cohen, 1999; Craig et al., 2001) have been performed to investigate imagination and creativity of autism via drawing tasks, and showed impairments of autism in imagination and creativity via drawing tasks.

In a word, art therapy plays a significant role in children with ASD, not only as a method of treatment, but also in understanding and investigating patients' problems.

Other Applications

In addition to the above mentioned diseases, art therapy has also been adopted in other applications. Dysarthia is a common sequela of cerebral palsy (CP), which directly affects children's language intelligibility and psycho-social adjustment. Speech therapy does not always help CP children to speak more intelligibly. Interestingly, the art therapy can significantly improve the language intelligibility and their social skills for children with CP (Wilk et al., 2010).

In brief, these studies suggest that art therapy is meaningful and accepted by both patients and therapists. Most often, art therapy could strengthen patient's emotional expression, self-esteem, and self-awareness. However, our findings are based on relatively small samples and few good-quality qualitative studies, and require cautious interpretation.

THE APPLICATION PROSPECTS OF ART THERAPY

With the development of modern medical technology, life expectancy is also increasing. At the same time, it also brings some side effects and psychological problems during the treatment process, especially for patients with mental illness. Therefore, there is an increasing demand for finding appropriate complementary therapies to improve life quality of patients and psychological health. Art therapy is primarily offered as individual art therapy, in this review, we found that art therapy was most commonly used for depression and anxiety.

Based on the above findings, art therapy, as a non-verbal psychotherapy method, not only serves as an auxiliary tool for diagnosing diseases, which helps medical specialists obtain much information that is difficult to gain from conventional tests, judge the severity and progression of diseases, and understand patients' psychological state from painting characteristics, but also is an useful therapeutic method, which helps patients open up and share their feelings, views, and experiences. Additionally, the implementation of art therapy is not limited by age, language, diseases or environment, and is easy to be accepted by patients.

Art therapy in hospitals and clinical settings could be very helpful to aid treatment and therapy, and to enhance communications between patients and on-site medical staffs in a non-verbal way. Moreover, art therapy could be more effective when combined with other forms of therapy such as music, dance and other sensory stimuli.

The medical mechanism underlying art therapy using painting as the medium for intervention remains largely unclear in the literature (Salmon, 1993; Broadbent et al., 2004; Guillemin, 2004), and the evidence for effectiveness is insufficient (Mirabella, 2015). Although a number of studies have shown that art therapy could improve the quality of life and mental health of patients, standard and rigorous clinical trials with large samples are still lacking. Moreover, the long-term effect is yet to be assessed due to the lack of follow-up assessment of art therapy.

In some cases, art therapy using painting as the medium may be difficult to be implemented in hospitals, due to medical and health regulations (may be partly due to potential of messes, lack of sink and cleaning space for proper disposal of paints, storage of paints, and toxins of allergens in the paint), insufficient space for the artwork to dry without getting in the way or getting damaged, and negative medical settings and family environments. Nevertheless, these difficulties can be overcome due to great benefits of the art therapy. We thus humbly believe that art therapy has great potential for mental disorders.

In the future, art therapy may be more thoroughly investigated in the following directions. First, more high-quality clinical trials should be carried out to gain more reliable and rigorous evidence. Second, the evaluation methods for the effectiveness of art therapy need to be as diverse as possible. It is necessary for the investigation to include not only subjective scale evaluations, but also objective means such as brain imaging and hematological examinations to be more convincing. Third, it will be helpful to specify the details of the art therapy and patients for objective comparisons, including types of diseases, painting methods, required qualifications of the therapist to perform the art therapy, and the theoretical basis and mechanism of the therapy. This practice should be continuously promoted in both hospitals and communities. Fourth, guidelines about art therapy should be gradually formed on the basis of accumulated evidence. Finally, mechanism of art therapy should be further investigated in a variety of ways, such as at the neurological, cellular, and molecular levels.

AUTHOR CONTRIBUTIONS

JH designed the whole study, analyzed the data, and wrote the manuscript. JZ searched for selected the studies. LH participated in the interpretation of data. HY and JX offered good suggestions. All authors read and approved the final manuscript.

FUNDING

This study was financially supported by the National Key R&D Program of China (2019YFC1712200), International standards research on clinical research and service of Acupuncture-Moxibustion (2019YFC1712205), the National Natural Science Foundation of China (62006220), and Shenzhen Science and Technology Research Program (No. JCYJ20200109114816594).

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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frontiers in Psychology

PERSPECTIVE
published: 27 August 2021
doi: 10.3389/fpsyg.2021.727231

Mechanisms of Music Impact: Autonomic Tone and the Physical Activity Roadmap to Advancing Understanding and Evidence-Based Policy

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Research demonstrates that both music-making and music listening have an ability to modulate autonomic nervous system activity. The majority of studies have highlighted acute autonomic changes occurring during or immediately following a single session of music engagement. Several studies also suggest that repeated music-making and listening may have longer-term effects on autonomic tone—the prevailing balance of sympathetic vs. parasympathetic activity. Autonomic *im*balance is associated with a range of neurodegenerative and neurodevelopmental disorders, mental health conditions and non-communicable diseases. Established behavioral interventions capable of restoring healthy autonomic tone (e.g., *physical activity; smoking cessation*) have demonstrated remarkable efficacy in broadly promoting health and preventing disease and up to 7.2 million annual deaths. Accordingly, this article proposes that music's suggested ability to modulate autonomic tone may be a key central mechanism underpinning the broad health benefits of music-making and listening reported in several recent reviews. Further, this article highlights how physical activity research provides a relevant roadmap to efficiently advancing understanding of music's effects on both autonomic tone and health more broadly, as well as translating this understanding into evidence-based policy and prescriptions. In particular, adapting FITT—*Frequency, Intensity, Timing, Type*—criteria to evaluate and prescribe music-making and listening in observational and intervention studies has excellent prospective utility.

Keywords: non-communicable diseases, FITT, music listening, music-making, exercise physiology

OPEN ACCESS

Edited by:
Stephen Clift,
Canterbury Christ Church University, United Kingdom

Reviewed by:
Graham Frederick Welch,
University College London, United Kingdom
Helena Daffern,
University of York, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *18 June 2021*
Accepted: *09 August 2021*
Published: *27 August 2021*

Citation:
McCrary JM and Altenmüller E (2021) Mechanisms of Music Impact: Autonomic Tone and the Physical Activity Roadmap to Advancing Understanding and Evidence-Based Policy. Front. Psychol. 12:727231. doi: 10.3389/fpsyg.2021.727231

INTRODUCTION

The broad health benefits of music listening and music-making are increasingly well acknowledged (Fancourt and Finn, 2020; McCrary et al., 2021), with a recent review noting that music has been associated with positive health effects across 13 domains (*most prominently auditory, cognitive, immune, self-reported health/wellbeing, and social functioning domains*) (McCrary et al., 2021). Accordingly, the most salient questions are quickly becoming less *if* and more *how* music can

be used to promote health, both in preventive and clinical/rehabilitative applications. More specifically, *what kind* of music engagement is most effective in addressing which health conditions? Additionally, *how often* and for *how long* should music engagement occur to best promote health and/or recovery in each specific circumstance?

In addressing these questions, present evidence remains limited. For instance, the recent review cited above found that as little as 30 min of music-making was associated with positive health effects in healthy populations, but could not support any further conclusions regarding the optimum music-making type, duration, frequency and health applications (McCrary et al., 2021). Such a detailed understanding is needed to inform evidence-based policy, prescriptions and care (Bickerdike et al., 2017; Clift et al., 2021), but is presently limited by common features of a young and developing evidence base: a substantial heterogeneity of interventions and outcome measures (Fancourt and Finn, 2020; McCrary et al., 2021) elucidating a glut of potential mechanisms (Fancourt et al., 2021) and leading to disparate and often contradictory outcomes (Clift, 2020; Fancourt and Finn, 2020; McCrary et al., 2021).

As a result, a strategic approach to future research is increasingly advocated to efficiently advance understanding and evidence-based policy and practice (Cheever et al., 2018; Fancourt et al., 2021). To this end, particular emphasis is being placed on theory-driven studies leveraging known mechanisms of music's impact to guide study hypotheses, design and outcome measures toward higher probability results (Craig et al., 2008; Cheever et al., 2018; Fancourt et al., 2021). Investigations based on mechanisms linked to multiple health effects are thus likely to be particularly high-impact. With this in mind, this article focuses on autonomic nervous system mechanisms potentially underpinning many of music's broad health effects.

Both music-making and music listening have demonstrated an ability to modulate autonomic nervous system activity (Ellis and Thayer, 2010; McCrary et al., 2021). The bulk of research has investigated acute autonomic changes during or immediately following a single session of music-making or listening, with these short-term effects linked most strongly to acute reductions in stress and anxiety, particularly in pre-operative settings (Allen and Blascovich, 1994; Bradt et al., 2013; Fu et al., 2019). Substantially less research has focused on music's sustained impact on autonomic tone—the prevailing balance of activity in the sympathetic vs. parasympathetic branches of the autonomic nervous system (Ellis and Thayer, 2010). However, a handful of studies do suggest that repeated music-making and listening may also have a long-term effect on autonomic tone (Takahashi and Matsushita, 2006; Le Roux et al., 2007; Okada et al., 2009; Chuang et al., 2011; Helsing et al., 2016; Kunikullaya et al., 2016; Ribeiro et al., 2018; Mojtabavi et al., 2020). The potential of music to modulate autonomic tone is particularly significant given profound links between autonomic tone and a wide range of physical, mental and social health conditions (Rosengren et al., 2004; Thayer et al., 2010; Beaglehole et al., 2011; Cohen et al., 2015; Emdin et al., 2016). Further, an ability to modulate autonomic tone is a key mechanism underpinning the impact of established behavioral health interventions (e.g., *physical activity; smoking cessation*) shown to broadly promote health and prevent disease and 1.6–7.2 million annual deaths (Stein et al., 1996; Iwane et al., 2000; Curtis and O'Keefe, 2002; Fu and Levine, 2013; Harte and Meston, 2014; Forouzanfar et al., 2016).

Accordingly, we propose that music's suggested ability to modulate autonomic tone may be a key central mechanism influencing the broad range of music's noted physical, mental and social health benefits (Fancourt and Finn, 2020; McCrary et al., 2021). The following sections explore how investigations of music's impact on autonomic tone can efficiently build understanding and broadly facilitate evidence-based prescriptions and policies. Additionally, later sections illustrate how physical activity research provides a relevant and adaptable roadmap to advancing and translating knowledge regarding music's effects on autonomic tone and health more broadly.

Autonomic Tone: A Central Mechanism of Music's Broad Health Impact?

Briefly (*for a comprehensive summary of the physiology and function of the autonomic nervous system please see* (McCorry, 2007; Low, 2011)*; key terms are highlighted in* ***Table 1***), the autonomic nervous system (ANS) is a division of the peripheral nervous system involved in mostly involuntary control of the major peripheral organs and organ systems (e.g., *cardiovascular, digestive, endocrine, integumentary, reproductive, respiratory, urinary, visual*). The ANS can be further divided into two main branches: a sympathetic branch broadly associated with energy mobilization (i.e., *"fight or flight" responses*); and a parasympathetic branch broadly associated with restorative and vegetative functions (i.e., *"rest and digest" responses*). Sympathetic excitation is linked to increased heart rate, blood pressure, low frequency heart rate variability and catecholamine/stress hormone release (e.g., *adrenaline; noradrenaline; cortisol*). Increased parasympathetic activation is linked to decreased heart rate and blood pressure and increased high frequency heart rate variability. In healthy individuals, the ANS dynamically responds to environmental demands before returning to a point of relative balance, stability and minimal energy use. This balance point is known as the "autonomic tone". If one ANS branch dominates over the other (i.e., "*autonomic imbalance*"), the ability to respond to environmental situations is compromised and system energy demands are often excessive and unsustainable.

Autonomic imbalance is associated, as a cause and/or consequence, with a broad range of health conditions and non-communicable diseases including neurodegenerative conditions (e.g., *Alzheimer's and Parkinson's*), neurodevelopmental disorders (e.g., *autism*), mental health conditions (e.g., *anxiety, depression*) and cardiovascular diseases—the leading cause of global deaths (Rosengren et al., 2004; Thayer et al., 2010; Beaglehole et al., 2011; Cohen et al., 2015; Emdin et al., 2016). Autonomic imbalance is also linked to chronic inflammation (Thayer et al., 2010), a key risk factor for cancers (*#2 most prevalent cause of global deaths* (Coussens and Werb, 2002; NCD Countdown 2030 Collaborators, 2020). Fortunately, behavioral interventions such as physical activity and smoking cessation have demonstrated remarkable efficacy in resolving autonomic imbalance and

TABLE 1 | Glossary of key terms.

Term	Description
Autonomic nervous system (ANS)	Division of the peripheral nervous system involved in involuntary control of major organs and organ systems
Sympathetic nervous system	One of two main branches of the autonomic nervous system; broadly associated with energy mobilization (i.e., "fight or flight" responses)
Parasympathetic nervous system	One of two main branches of the autonomic nervous system; broadly associated with restorative and vegetative functions (i.e., "rest and digest" responses)
Autonomic tone	The prevailing balance point of sympathetic and parasympathetic nervous system activation
Sympathetic activation	Short-term excitation/arousal of the sympathetic nervous system; commonly quantified by increased heart rate, blood pressure, low frequency heart rate variability and catecholamine/hormone release
Parasympathetic activation	Short-term excitation of the parasympathetic nervous system; commonly quantified by decreased heart rate and blood pressure and increased high-frequency heart rate variability
Heart rate variability	A measure of variation in the time between heart beats (inter-beat interval); frequency-domain analyses of inter-beat intervals provide insights into the relative balance of sympathetic and parasympathetic activation
Catecholamines	Hormones responsible for sympathetic activation—e.g., adrenaline, noradrenaline

restoring healthy autonomic tone (Stein et al., 1996; Iwane et al., 2000; Curtis and O'Keefe, 2002; Fu and Levine, 2013; Harte and Meston, 2014).

Music engagement has also shown an ability to positively modulate autonomic tone in several studies. Repeated engagement with music therapy including both listening and music-making components (*5 weeks to 2 years of weekly 30–45 min sessions* (Takahashi and Matsushita, 2006; Okada et al., 2009; Chuang et al., 2011; Ribeiro et al., 2018)) and recorded music listening (*3 days to 3 months of 15–30-min daily sessions* (Le Roux et al., 2007; Helsing et al., 2016; Kunikullaya et al., 2016)) has been linked to positive shifts toward increased parasympathetic tone. Increased parasympathetic tone in these studies is evidenced by changes in resting heart rate variability (Okada et al., 2009; Chuang et al., 2011; Ribeiro et al., 2018) and reduced blood pressure (Takahashi and Matsushita, 2006; Kunikullaya et al., 2016) and plasma catecholamines and stress hormones (Le Roux et al., 2007; Okada et al., 2009; Helsing et al., 2016). One study of music therapy also notably associated changes in autonomic tone with a significant reduction in heart failure events (Okada et al., 2009).

These positive results were reported in a range of populations—mothers of preterm infants (Ribeiro et al., 2018); combined cerebrovascular disease and dementia (Okada et al., 2009); breast cancer (Chuang et al., 2011); dementia alone (Takahashi and Matsushita, 2006); infectious lung disease (Le Roux et al., 2007); healthy adults (Helsing et al., 2016); and hypertensives (Kunikullaya et al., 2016). It should be noted, however, that these studies reporting positive effects of music on autonomic tone also each contain significant limitations and/or confounds—substantially underpowered (Ribeiro et al., 2018); non-randomized (Okada et al., 2009) or uncontrolled single group designs/analyses (Chuang et al., 2011; Helsing et al., 2016; Kunikullaya et al., 2016); mixed positive & null results on multiple measures of autonomic tone (Takahashi and Matsushita, 2006; Kunikullaya et al., 2016); and investigations of other interventions with or without added music listening (*physiotherapy* (Le Roux et al., 2007)*; lifestyle* (Kunikullaya et al., 2016)). Further studies have also found no effects of repeated recorded music listening (*2 days to 2 weeks of daily 30-min sessions*) on salivary and urinary stress hormone and plasma catecholamine levels (Chlan et al., 2013; Hu et al., 2015). These studies reporting null results investigated music listening in different clinical populations—mechanically ventilated (Chlan et al., 2013) and ICU patients (Hu et al., 2015)—with the study of ICU patients also notably confounded by using music and "nature sounds" as a combined intervention (Hu et al., 2015).

Well-controlled investigations of specific types of music engagement (e.g., *music-making vs. listening*) in specific populations may yield insights that help further clarify presently preliminary and limited results. However, evidence from physical activity and smoking cessation research (Stein et al., 1996; Iwane et al., 2000; Curtis and O'Keefe, 2002; Harte and Meston, 2014) indicates that such investigations would likely be still significantly confounded by a key additional variable: acute autonomic responses to music interventions. Acute autonomic responses to both music-making and listening interventions have been shown to significantly vary across individuals (Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Lynar et al., 2017). Physical activity research has effectively integrated consideration of potentially confounding acute autonomic responses into a robust body of research, prescriptions and policy related to autonomic tone and health more broadly. Accordingly, physical activity research provides a particularly relevant research and translation roadmap with prospective utility in guiding future music investigations.

The Physical Activity Roadmap—Understanding Links Between Acute and Longer-Term Autonomic Effects

Physical activity research has developed, over 65+ years of investigations, a convincing framework for understanding the autonomic and broader health impacts of leisure-time activities and translating this understanding into evidence-based policy and care (Heath et al., 2012; Varela et al., 2018). The first major study of physical activity was published in 1953 and supported the first hypotheses that "physically active jobs" (*in this case, London postmen/bus conductors vs. government clerks/bus drivers*) may be

protective against heart attacks and disease (Morris et al., 1953). Presently, a clear dose-response relationship between increased physical activity and increased quality of life and a decreased risk of early mortality and up to 25 non-communicable diseases has been established (Arem et al., 2015; Rhodes et al., 2017). Further, physical activity research has been translated into evidence-based global physical activity recommendations, prescriptions and action plans (World Health Organization [WHO], 2010; American College of Sports Medicine, 2013; World Health Organization [WHO], 2019), as well as a growing and sustaining research funding ecosystem (Fernhall et al., 2015).

A key insight informing present knowledge regarding physical activity's extensive health effects is the impact of acute exercise-induced autonomic changes on sustained modulations in autonomic tone (Iwane et al., 2000; Curtis and O'Keefe, 2002). Similar links between acute autonomic changes and sustained modulations in autonomic tone have also been demonstrated in smoking cessation research (Stein et al., 1996; Harte and Meston, 2014). Exercise increases sympathetic activity, with the magnitude of the acute sympathetic response to physical activity shown to be reliably moderated by exercise intensity—the higher the intensity (i.e., *more vigorous the activity*), the greater the sympathetic response (Hautala et al., 2009). Broadly, the greater the cumulative weekly exercise-induced sympathetic response, the greater the impact on health and the maintenance and restoration of well-balanced autonomic tone (Arem et al., 2015; Rhodes et al., 2017).

Crucially, increased sympathetic activation during exercise also leads to a proportional increase in post-exercise parasympathetic activation, known as the "relaxation response" (Iwane et al., 2000; Curtis and O'Keefe, 2002; Fu and Levine, 2013; Rhodes et al., 2017). With regular physical activity, post-exercise parasympathetic activation becomes more robust and efficient, a change that is proposed to underpin broader improvements in autonomic tone (Fu and Levine, 2013; Pierpont et al., 2013). Music-making and listening to pleasurable and uplifting music are associated with a similar acute autonomic "relaxation response"—increased sympathetic arousal during music-making and listening to many, but not all, types of music, followed by an increase in parasympathetic activity after the music stops (Grape et al., 2002; Rickard, 2004; Bernardi et al., 2006; Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Sakamoto et al., 2013; Lynar et al., 2017). In contrast, stress and pharmaceutical-induced sympathetic excitation do not lead to substantial increases in parasympathetic activity after arousal (Watkins et al., 1998; Curtis and O'Keefe, 2002).

To efficiently capture and/or control the cumulative weekly sympathetic response, physical activity is typically assessed and "prescribed" (e.g., *in intervention studies)* according to FITT—Frequency, Intensity, Timing (i.e., *duration of each exercise bout),* Type—criteria in observational and intervention studies (Barisic et al., 2011; Rhodes et al., 2017). FITT criteria thus consider both key practical information about the physical activity being performed (*Frequency, Timing, Type*), as well as the central mediator of the magnitude of the acute sympathetic and broader physiologic responses (*Intensity)* (Barisic et al., 2011; Rhodes et al., 2017). Inclusion of Intensity thus allows individual acute autonomic responses to physical activity to be considered and/or controlled in research and prescriptions. Both objective (e.g., *heart rate; accelerometry*) and self-report assessments have demonstrated good validity in capturing the Intensity, as well as Frequency, Timing and Type, of daily, weekly and "typical week" physical activity (Barisic et al., 2011; Rhodes et al., 2017).

FITT criteria have enabled broad research insights to be efficiently organized toward the establishment of a dose-response relationship between increased weekly aerobic physical activity (*Intensity * Timing * Frequency*) and improved health and reduced disease risk (Barisic et al., 2011; Arem et al., 2015; Rhodes et al., 2017). Further, this knowledge has been easily translated into policy and prescriptions (World Health Organization [WHO], 2010; American College of Sports Medicine, 2013; World Health Organization [WHO], 2019), as clearly illustrated by World Health Organization physical activity guidelines—150 min (*Timing*) of weekly (*Frequency*) moderate-vigorous (*Intensity*) aerobic (*Type*) activity (World Health Organization [WHO], 2010).

Similar links between acute music-induced autonomic changes and sustained modulations of autonomic tone are likely (**Figure 1**). However, studies of the effects of repeated music engagement on autonomic tone have only considered and prescribed FTT (*Frequency, Timing, and Type*) criteria (Takahashi and Matsushita, 2006; Le Roux et al., 2007; Okada et al., 2009; Chuang et al., 2011; Chlan et al., 2013; Hu et al., 2015; Helsing et al., 2016; Kunikullaya et al., 2016; Finn and Fancourt, 2018; Ribeiro et al., 2018; Fancourt and Finn, 2020; Mojtabavi et al., 2020; McCrary et al., 2021). Similarly, observational and intervention studies of the effects of repeated music engagement on health conditions linked to autonomic tone have not assessed and/or controlled the acute autonomic responses to music-making or listening (Fancourt and Finn, 2020; McCrary et al., 2021). These acute autonomic responses cannot be assumed to be consistent, as significant subjective variations to music engagement with identical FTT have been demonstrated—performing or listening to the same piece of music can elicit a significant sympathetic response in one individual but minimal response in another, both on average and during emotional "peaks" in the music (Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Lynar et al., 2017). Similar to physical activity, the magnitude of this acute sympathetic response during music engagement has been shown to be mediated by Intensity—music listening by emotional intensity (Rickard, 2004; Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Lynar et al., 2017), and music-making by a combination of emotional, cognitive and physical intensities (Nakahara et al., 2009; Hahnengress and Böning, 2010; McCrary et al., 2016, 2021; Yuksel et al., 2016). Further, and in contrast to physical activity, music listening has also been shown to induce a parasympathetic response during engagement, particularly during listening to relaxing music (White, 1999; Conrad et al., 2007; Kume et al., 2017); the mediators of this parasympathetic response, particularly the magnitude, are presently unclear. If proposed links between the acute and sustained autonomic effects of music

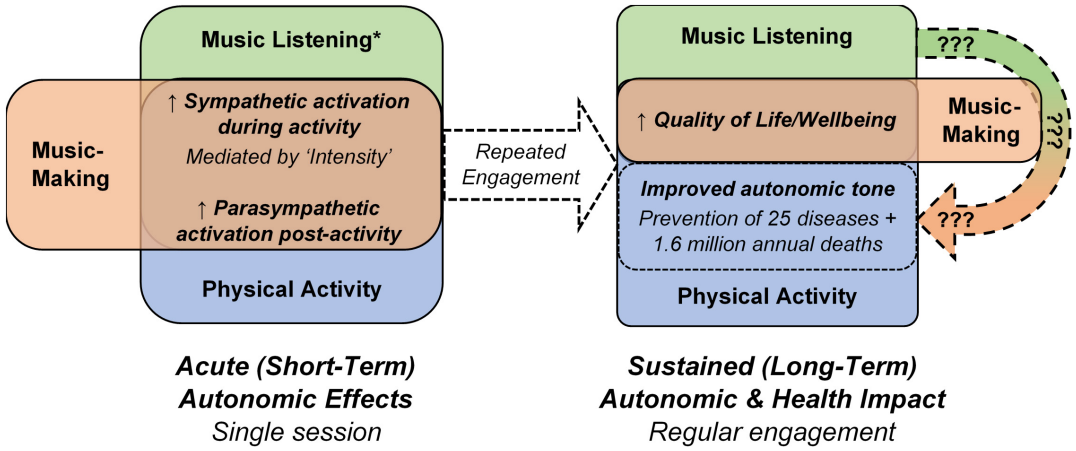

FIGURE 1 | Comparison of the acute autonomic and sustained autonomic and health effects of music listening, music-making and physical activity. The unclear impact of music listening and music-making on autonomic tone and related health outcomes (Fancourt and Finn, 2020; McCrary et al., 2021) is noted by the curved arrow containing question marks. * does not apply to all types of music listening; some types of music listening elicit parasympathetic responses during the listening activity.

do indeed exist, the present prevalence of conflicting results of studies of music's impact on health and autonomic tone are then unsurprising (Takahashi and Matsushita, 2006; Le Roux et al., 2007; Okada et al., 2009; Chuang et al., 2011; Chlan et al., 2013; Hu et al., 2015; Helsing et al., 2016; Kunikullaya et al., 2016; Finn and Fancourt, 2018; Fancourt and Finn, 2020; Ribeiro et al., 2018; Mojtabavi et al., 2020; McCrary et al., 2021)—a large proportion of studies are likely to be confounded by an ambiguity of acute autonomic responses to the FTT of music-making and listening being analyzed.

The Physical Activity Roadmap—Adapting FITT to Evaluate and Prescribe Music Engagement

The FITT approach carries significant promise as a means of efficiently yet comprehensively evaluating and prescribing music-making and listening to better understand their sustained effects on autonomic tone and related health conditions. Frequency, Timing and Type data would continue to provide valuable interrogative information regarding the music engagement being prescribed or analyzed. The addition of Intensity would enable individual acute autonomic responses to be considered and/or controlled in future music studies, providing more detailed insights into the mechanisms of music's effects and a framework for standardizing a likely confounder. Given similarities in their acute autonomic responses, music-making and listening can be broadly considered under the same FITT framework. However, the practicalities of evaluating and prescribing Intensity require distinct approaches, particularly given differential Intensity mediators of the acute autonomic responses to music-making and listening (*music-making—cognitive, emotional and physical mediators; music listening—emotional mediators*) (Rickard, 2004; Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Hahnengress and Böning, 2010; McCrary et al., 2016, 2021; Yuksel et al., 2016; Lynar et al., 2017).

The absence of prior investigations evaluating or prescribing acute autonomic responses to repeated music engagement leaves a wholly blank slate for the development of new strategies. However, physical activity research and prior studies of the acute autonomic responses to music provide some guidance. The Intensity, as well as the Frequency and Timing, of music-making and listening could be evaluated using established quantitative methods with demonstrated sensitivity to the acute autonomic responses to both music-making and listening (e.g., *heart rate; heart rate variability; skin conductance; hormone, and catecholamine levels*) (Rickard, 2004; Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009; Chapin et al., 2010; Hahnengress and Böning, 2010; McCrary et al., 2016, 2021; Yuksel et al., 2016; Lynar et al., 2017; Finn and Fancourt, 2018). A key distinction from physical activity with these assessments is that the acute autonomic responses will be reflective of emotional Intensity (*music listening*) or composite emotional/cognitive/physical Intensity (*music-making*), rather than the Intensity of physical exertion. The magnitude of acute autonomic responses to music-making and listening could be quantified as a% of the response at an experimentally determined peak Intensity, similar to established approaches in physical activity research (American College of Sports Medicine, 2013). New portable methods of easily and remotely collecting combined heart rate, heart rate variability and skin conductance data (e.g., Empatica E4 wristband (McCarthy et al., 2016)) enable collection of detailed objective autonomic data from an expanded range of music listening contexts. Wireless heart rate assessment is favored for capturing relatively larger acute autonomic responses to music-making due to limitations of heart rate variability in reflecting the autonomic response to increased physical intensity (Casadei et al., 1995; Polanczyk et al., 1998), in addition to the complicating effect of movement artifacts on skin conductance measurements (Dean and Bailes, 2015).

Indirect evaluation of acute autonomic responses using questionnaire assessments of Intensity has particular prospective utility in epidemiologic and observational studies, but requires additional preliminary work to ensure validity in a music context. Established FITT questionnaires from physical activity (Barisic et al., 2011; Rhodes et al., 2017), as well as music assessments addressing FTT criteria and emotional Intensity mediators of the acute sympathetic response (e.g., *Goldsmiths Musical Sophistication Index; Music USE Questionnaire*) (Chin and Rickard, 2012; Müllensiefen et al., 2014), provide an excellent foundation for the development of new self-report FITT instruments. Development processes must also consider different Intensity mediators of the acute autonomic responses to music-making and listening; additional cognitive and physical Intensity items will likely be required to completely capture the acute responses to music-making. Further, initial self-report assessments will likely be confined to Types of music listening associated with clear emotional Intensity mediators (e.g., *pleasurable and uplifting music* (Rickard, 2004; Grewe et al., 2007a,b; Nakahara et al., 2009; Salimpoor et al., 2009Chapin et al., 2010; Lynar et al., 2017)), pending further study clarifying the emotional Intensity mediators of other music Types (e.g., *relaxing music*). Validation studies evaluating the links between questionnaire Intensity items and objective assessments of the acute autonomic response (e.g., *using methods described above*) would ensure that self-report Intensity items adequately and reliably reflect overall acute autonomic responses.

A relatively more complex task is adapting the FITT framework, in particular Intensity, to prescribe music-making and listening activities with standardized acute autonomic responses for research, clinical and general public use. In particular, development of FITT prescription strategies which translate beyond controlled research and clinical interventions to public health applications is likely to be a similarly long-term challenge for music as it was for physical activity (Varela et al., 2018). However, FITT prescriptions of music-making and listening for research and clinical interventions are more immediately feasible. To this end, we propose two examples of FITT music intervention prescriptions likely to elicit standardized acute autonomic responses while maintaining the integrity of the musical experience by keeping a focus on expression and creativity. Research demonstrates that listening to self-selected music eliciting the greatest feelings of pleasure is linked to the greatest acute sympathetic response (Salimpoor et al., 2009; Lynar et al., 2017). Accordingly, a "high Intensity" music listening prescription could be: 150 min (*Timing*) of weekly (*Frequency*) listening to self-selected music (*Type*) which will elicit the "greatest feelings of pleasure" (*Intensity*). Intervention fidelity could be tracked using objective measurement strategies described above (e.g., *Empatica E4 wristband*). In a music-making context, a prescription could be: twice-weekly (*Frequency*) 50-min (*Timing*) group drumming sessions (*Type*) at an average of 65–80% of peak composite emotional/cognitive/physical drumming *Intensity*. Peak drumming Intensity could be defined by heart rate responses and experimentally determined at the beginning of the intervention to inform target Intensity zones. Heart rate data could be collected during group drumming sessions but would not necessarily need to be monitored during sessions themselves—post-session analyses by research/clinical staff could be used to detail the observed Intensity of each session and inform modifications to future sessions to ensure consistent achievement of target Intensity by intervention participants. In both music listening and music-making FITT intervention sessions, a single blind approach to collecting acute autonomic response data is advisable to help maintain participant focus on the creative and expressive, rather than physiologic, musical experience.

DISCUSSION

The impact of music-making and listening on autonomic tone is potentially a key central mechanism underpinning many of music's broad health effects—unhealthy autonomic tone is linked to a range of physical, emotional and social health conditions (Rosengren et al., 2004; Thayer et al., 2010; Beaglehole et al., 2011; Cohen et al., 2015; Emdin et al., 2016). Physical activity research provides a relevant roadmap to efficiently understanding the impact of repeated music engagement on autonomic tone, emphasizing the importance of considering and controlling the acute autonomic effects of music-making and listening in observational and intervention studies. Specifically, adapting the FITT approach from physical activity research may provide an effective framework for evaluating and prescribing acute autonomic effects alongside established moderators of music's health impact (*Frequency, Timing, Type*) (Fancourt and Finn, 2020; McCrary et al., 2021). Over the longer-term, the FITT approach has also been shown to facilitate easy translation of research into evidence-based policy and clinical prescriptions (World Health Organization [WHO], 2010; American College of Sports Medicine, 2013; World Health Organization [WHO], 2019).

FITT evaluation/prescription of repeated music engagement must be paired, however, with sensitive and reliable autonomic tone study endpoints to most rigorously assess the impact of music engagement on autonomic tone. Physical activity research also provides valuable guidance in this domain. Specifically, four non-invasive clinical cardiac autonomic assessments have been shown to be both reliable and sensitive to intervention effects: resting heart rate; heart rate variability during seated deep breathing; chronotropic incompetence (i.e., *inability to reach 85% of maximum heart rate during exercise*); and post-exercise heart rate recovery (Tsuji et al., 1994; Lauer et al., 1996; Curtis and O'Keefe, 2002; Cooney et al., 2010; Zhang et al., 2016; Gulgun, 2017; Qiu et al., 2017). Each of these cardiac autonomic endpoints have also been independently linked to disease and mortality outcomes (Tsuji et al., 1994; Lauer et al., 1996; Curtis and O'Keefe, 2002; Cooney et al., 2010; Zhang et al., 2016; Gulgun, 2017; Qiu et al., 2017), and may provide superior utility in music investigations vs. catecholamine and hormone analyses of autonomic tone with prevailing reliability concerns (Everds et al., 2013; Segerstrom et al., 2014). However, it should be noted that these assessments are suggested to represent complementary domains of autonomic tone (Gulgun, 2017), encouraging

a multimodal approach to assessment of music engagement effects, particularly in initial studies.

CONCLUSION

Music and health research is presently at an exciting junction, tasked with translating strong indications of music's broad health benefits into a specific understanding capable of supporting evidence-based public health and clinical solutions. Music's prospective ability to modulate autonomic tone is an intriguing central mechanism potentially underpinning many reported health benefits. Established insights and approaches (e.g., FITT) from physical activity research provide valuable guidance on how understanding of music's effects on autonomic tone can be efficiently advanced and translated into prescriptions and policies.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

JMM drafted the manuscript. EA provided critical revisions. Both authors approved the final version.

FUNDING

JMM was supported by the Postdoctoral Fellowship from the Alexander von Humboldt Foundation.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
published: 06 September 2021
doi: 10.3389/fpsyg.2021.730709

A Randomized Waitlist-Controlled Trial of an Intergenerational Arts and Heritage-Based Intervention in Singapore: Project ARTISAN

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Edited by:
Hyemin Han,
University of Alabama, United States

Reviewed by:
Aline Camille Gubrium,
University of Massachusetts Amherst, United States
Nile Stanley,
University of North Florida, United States

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *25 June 2021*
Accepted: *03 August 2021*
Published: *06 September 2021*

Citation:
Ho AHY, Ma SHX, Tan MKB and Bajpai RC (2021) A Randomized Waitlist-Controlled Trial of an Intergenerational Arts and Heritage-Based Intervention in Singapore: Project ARTISAN. Front. Psychol. 12:730709. doi: 10.3389/fpsyg.2021.730709

Loneliness has become a global major public health concern, with detrimental effects to the young and old. ARTISAN (Aspiration and Resilience Through Intergenerational Storytelling and Art-based Narratives) is a 5-week, 15-h participatory art and group-based intervention that focuses on resilience building and loneliness alleviation among the young and old through a structured multimodal framework held at a museum space. Developed with a Participatory Action Research (PAR) approach, this intervention is evaluated using an open-label waitlist randomized controlled trial design (RCT) comprised of community-dwelling youth and older adults randomized into an intervention group ($n = 35$) or a waitlist-control group ($n = 33$). Participants were assessed on standardized self-reported psychometric measures including loneliness, resilience, quality of life, social support, life satisfaction and national identity at three time points. Qualitative data generated during each intervention session as well as acceptability focus groups were recorded and transcribed. Linear mixed modeling analyses revealed that participants in the intervention group experienced improvements in life satisfaction compared to participants in the waitlist-control group (95% CI: 0.22 to 0.77, $p < 0.001$, Cohen's $d = 0.53$) immediately after the completion of ARTISAN. Subgroup analyses for youth participants indicated improvements in quality of life (95% CI: 0.16 to 0.52, $p < 0.001$, $d = 1.31$) and national identity (95% CI: 0.18 to 0.80, $p = 0.002$, $d = 0.43$) in comparison to the waitlist-control group. At 5-weeks follow-up, the intervention group participants continued to experience high levels of life satisfaction (95% CI: 0.04 to 0.42, $p = 0.017$, $d = 0.47$), enhancements in resilience (95% CI: 0.07 to 0.55, $p = 0.011$, $d = 0.46$), as well as a significant reduction in loneliness (95% CI: −0.34 to −0.08, $p = 0.001$, $d = 0.61$) compared to baseline, reflecting the effectiveness and positive residual effects of the ARTISAN intervention. Similarly, the qualitative findings provided support for the intervention and additional insights to the quantitative findings. This holistic intervention

framework that integrates stories, arts and heritage for bridging and empowering lives fills a critical gap in knowledge and practice between the arts, health and citizenship, paving the way for further research in creating a more caring and inclusive society with the arts.

Clinical Trials Registration: www.ClinicalTrials.gov, identifier: NCT03048708.

Keywords: participatory art, museum, intergenerational relations, resilience, loneliness, life satisfaction, health

INTRODUCTION

Loneliness has become a major global public health concern in the twenty first century and this has been worsened by the COVID-19 pandemic, where individuals are further isolated by physical distancing restrictions and lockdowns. Research has consistently found that loneliness is associated with a wide spectrum of comorbid health conditions including cardiovascular disease, disability, cognitive decline, depression and premature mortality among older adults (Hawkley and Cacioppo, 2003; Cacioppo et al., 2006; Lund et al., 2010; James et al., 2011; Steptoe et al., 2013). Moreover, direct links between loneliness and health care utilization are reported in both overseas and local literature (Gerst-Emerson and Jayawardhana, 2015; Lim and Chan, 2017). The detrimental impact of loneliness on mental health is particularly worrying under the context of population aging as statistics indicate that approximately 12–35% of older adults above the age of 65 report feelings of chronic loneliness in advanced societies such as the United States (Wilson and Moulton, 2010; Perissinotto et al., 2012). Similar alarming statistics were also found in the rapidly aging society of Singapore, as 51% of local older adults report feelings of loneliness, with 19% being lonely most of the time and 32% feeling lonely some of the time (Chan et al., 2015). Loneliness is prevalent not only among the old, but also among the young (Victor and Yang, 2012). Recent research in England reported youth and young adults experiencing loneliness more often than other age groups (Pyle and Evans, 2018), with one in three suffering from loneliness (British Red Cross, 2016). In parallel, Singaporean youths often find themselves feeling alone and unsupported with mounting pressure to succeed in a highly competitive education system and labor market, and while they aspire to find meaningful connections through social media, most are left disappointed with hollow relationships and constant negative social comparisons (Ho et al., 2017a). The psycho-socio-emotional impact of loneliness on young people can be devastating, leading to increased risk for illness, anxiety, depression, self-harm behaviors, and suicide (Schinka et al., 2012). Researchers in the United Kingdom have estimated the financial cost of loneliness to employers, including associated health problems, sick days, reduction in productivity and staff turnover to be £2.5 billion or SGD$4.5 billion a year (New Economics Foundation, 2017).

The urgent need to alleviate loneliness can be achieved sustainably through the cultivation of resilience and social connectedness among and between the young and the old (Lucini, 2013; Lau, 2016). Psychological hardiness coupled with supportive relational bonds can nurture a strong sense of identity, one that helps individuals navigate the increasing complexity of modern social life, empowers them toward civic engagements and compassionate actions, and ultimately contribute to a caring and inclusive society. Such a society of empowered citizens is what Singapore's Ministry of Culture, Community and Youth (MCCY) aims to help build through its range of policies and (Ministry of Culture Community and Youth, 2018). Arts and heritage is one of the most important vehicles to attain these goals, with the UK National Alliance for Arts, Health and Well-being affirming that arts and heritage "help keep the individual resilient, aid recovery and foster a flourishing society" (Culture Health and Wellbeing Alliance, 2012). Putnam et al. (2004, p. 29) further states that "the arts can nurture social capital by strengthening friendships, helping communities to understand and celebrate their heritage, and provide a safe way to discuss and solve difficult social problem… to transcend the boundaries that divide us and to find deeper spiritual connections with those like us."

Research around the world including those from Singapore have generated a wealth of evidence that point to the efficacy of the arts and heritage for building resilience and social connectedness (Staricoff, 2004; Fancourt and Finn, 2019). The Arts for Ageing Well Study, a national survey conducted in Singapore found that art engagements significantly enhance psychological health, social integration, life meaning and spiritual well-being among soon-to-be and current generations of older adults (Ho et al., 2019). Study findings also reveal that storytelling is deemed as one of the most treasured art forms by the Singaporean older adults for promoting mental and social wellness, as it enables them to reflect and reframe their life experiences into meaningful and coherent narratives that can be shared with others for establishing authentic and empathic relationships (Ho et al., 2017b). Through the reconstruction of self-defining stories, individuals build a narrative identity that draws heavily on prevailing cultural norms and social heritage to form a renewed understanding of and connection with self, others and society (McAdams, 1988). This narrative identity processing has repeatedly been found to be a critical pathway for healthy personality development, positive self-transformation and enhanced social relationships from adolescence to late adulthood (Pals, 2006; McAdams, 2011). Positive narrative identities can be constructed through different forms of storytelling, and art-based interventions that emphasize creativity and imagination for sharing and bridging individual stories are found to be especially effective in promoting resilience, cultivating

compassion, reducing social distance, and citizen empowerment (Ho et al., 2017c).

Moreover, research on the role of cultural artifacts and heritage institutions in the creation of identity and social cohesion also indicate that heritage spaces can function competently as community hubs for encounters, interactions and building trust between different members of society (Watson, 2007; Moody and Phinney, 2012; Murzyn-Kupisz and Działek, 2013). Potash et al. (2018) developed a conceptual model to explicate the intricate mechanisms for citizen empowerment and promoting compassionate actions through stories, arts, and heritage. With human relationships forming the foundational core of this model, citizen empowerment can be achieved through the activation of four elements: narrative, encounter, reflection, and community. This model illuminated the essential need to integrate stories, arts, and heritage to construct a creative and immersive space that empowers citizen and activates compassion. This space, which cannot be constructed by a single intervention element but requires a structured integration of different intervention modalities (i.e., narratives, storytelling, art making, art spaces), provides the necessary condition for individuals to experience truly authentic connections, an "i-thou" relationship as described by Buber and Smith (2000) that transcends isolation. This relationship involves a wholly mutual, full experiencing of the self and the other; one that is indispensable for building a caring and inclusive society, a society that is fully competent in alleviating and overcoming loneliness. All these empirical works underscore the utility of stories, arts and heritage to strengthen identity for citizen empowerment and loneliness alleviation.

Project ARTISAN was the research team's concerted effort to address the urgent public health problem of loneliness via citizen empowerment. Founded upon the Participatory Action Research (PAR) paradigm (Whyte et al., 1991), ARTISAN (Aspiration and Resilience Through Intergenerational Storytelling and Art-based Narratives) entails a 5-week, 15-h, group-based intervention that brings together youths and older adults to embark on a journey of facilitated intergenerational storytelling and creative art-making under the skylights of museum and community spaces. This intervention focuses on building resilience and social connectedness among the young and old through a structured and holistic multimodal framework. Specifically, ARTISAN combines the distinct integrative elements of (1) Reflective self-expression and communal sharing of personal narratives through professional facilitated storytelling; (2) Narrative identity processing and meaningful intergenerational bonding through guided art-making and creative-writing, and (3) Immersive and creative environment for self-discovery and social-transformation through curated art spaces illuminated by social artifacts and stories of national heritage. This converges upon a one-of-its-kind multimodal intervention framework that is intricately structured and uniquely holistic for instilling positive and impactful changes. This article reports the acceptability and effectiveness of the ARTISAN intervention in loneliness alleviation and enhancements in psychological well-being. As this was a pilot study, no a priori hypotheses were developed.

MATERIALS AND METHODS

This interventional study adopted an open-label waitlist randomized controlled trial design (RCT) design comprising of two groups: an intervention group and a waitlist control group. The trial was registered on 20th July 2018 on ClinicalTrials.gov [ID: NCT03593967]. Youth and older adult participants were recruited for the study. Eligible and consenting participants were randomly paired to form a youth-elder dyad that engaged in the 15-h, 5-week intervention on a weekly basis. Pre, post, and follow-up data were collected and analyzed to evaluate intervention effectiveness in achieving the stated objectives. Ethical approval was received from Nanyang Technological University's Institutional Review Board [IRB-2018-01-005] prior to the commencement of the study.

Sampling

A sample of 60 participants (30 youths and 30 older adults), accounting for an attrition rate of 10% will provide 80% power to detect an effect size of 0.8 (Lambert and Ogles, 2004) between the intervention group and the control group at 5% level of significance (two-tailed test). Participants were recruited through community partners including higher education institutions (Ngee Ann Polytechnic, Nanyang Technological University and Nanyang Polytechnic) and a large eldercare organization (TOUCH Community Services) in Singapore. Older adults aged 60 and above and youths aged 18 to 35, with the ability to communicate and understand English or Mandarin, as well the ability to commit and participate in the weekly activity for 5 weeks were included in the study. Persons who were unable to provide informed consent, too ill to participate or clinically diagnosed with major mental health conditions were excluded from the study. The allocation ratio was 1:1 for the intervention group and the waitlist control group.

Intervention Design

This study adopted a Participatory Action Research (PAR) approach to develop the ARTISAN intervention protocol. Intervention contents such as weekly themes, schedules and art activities were jointly developed by community partners, museum representatives, artists, and the research team. The collaborating artists for this study were leading art educators and professional art therapists who specialized in art program development for older adults and youths. Museum representatives were from Singapore's oldest museum, the National Museum of Singapore. Discussions were first conducted with community collaborators to understand the needs of their community, followed by program development with the museum representatives and collaborating artists. The preliminary protocol was then presented to a group of older adults for their feedback and refinements to the intervention contents were made accordingly. Respondents from the intervention design phase were different from participants who registered for the study. The finalized ARTISAN protocol was a 5-week, 15-h group based intergenerational arts and heritage intervention with specific intervention components including guided museum tours, professionally led artmaking, guided

storytelling and reflective writing that covered five intervention themes. Each ARTISAN intervention group consisted of 8 youth and 8 older adults which remained intact for the entire intervention. The weekly themes consisted of (1) Discovering our National Heritage, (2) Strengthening Social Bonds, (3) Overcoming Adversities and Resilience, (4) Building our Dreams and Aspirations, (5) Sharing our Stories and Legacies. An ARTISAN session was delivered bilingually in both English and Mandarin by a docent, professional artist or trained art therapist as well as the research staff. The first 4 weeks of the intervention was conducted at the National Museum of Singapore, and the fifth session was conducted at a community space, specifically at a void deck near the older participant's residential area. Void decks are communal spaces located on the ground level of public housing flats in Singapore (Koh, 2015). Each session starts with a 45-min guided tour by the docents on selected artifacts. Following the tours, participants engaged in a 90-min artmaking and facilitated storytelling segment where they were encouraged to share their personal stories with their paired youth or older participant. Each week, participants were introduced to new art mediums (air-dry clay, acrylic paints, beads, and recycled materials—refer to **Figure 1**) and worked on a collaborative piece of art based on the themes. When the art pieces were completed, dyads engaged in a short reflective writing activity to document their experience and insights for the day and shared their reflections with the larger group. For the fifth and final session, the art pieces created in the earlier weeks were brought to a community space where participants curated a community exhibition, celebrated their achievements, and shared words of gratitude to their partner as well as the group. **Table 1** details the intervention components of ARTISAN.

Research Procedures

Interested participants were referred to the research team by appointed coordinators from community partners. Participants registered for the trial based on a specific set of program dates, with the contents of the intervention and allocation procedures concealed from them. Upon completion of informed consent and baseline assessments, group allocation was revealed and participants from each age group were randomly paired to form one-to-one elder-youth dyads for the full project duration, forming four groups comprising of 7–8 dyads each, with two intervention groups and two wait-list control groups. Quantitative assessments were conducted for all groups at baseline [T1], thereafter the intervention group underwent the 5-week ARTISAN intergenerational arts intervention. Participants in the waitlist control group did not receive any intervention for the first 5 weeks. Upon completion of ARTISAN among the intervention group, all four groups were assessed again [T2]. Subsequently, the waitlist-control group received the same 5-week intervention. At the end of all intervention components, a final exit assessment was conducted on all groups [T3]. Youth participants completed the questionnaires online, while older participants completed pen-and-paper questionnaires. The questionnaires were administered in English or Mandarin. For older adults who were unable to read, a trained research staff administered the questionnaire to the participant. Each participant received a small monetary incentive upon completion of the assessment. Participants were invited to engage in acceptability focus group discussions after the intervention to provide their feedback and suggestions for the ARTISAN intervention protocol. A flow diagram of recruitment and study conduct can be found in **Figure 2**.

Outcome Measures

Outcomes were assessed with quantitative and qualitative measures. All study participants were assessed by a battery of standardized self-reported psychometric measures on well-being, personhood and nationhood at three time points: [T1] baseline; [T2] immediately post-intervention/second baseline; and [T3] 5 weeks follow-up/ immediately post-intervention. In addition to the quantitative assessment, group discussions and feasibility focus groups were recorded with the consent of the participants and transcribed verbatim for analysis.

Quantitative Measures

Demographic information including age, gender, ethnicity, marital status, living arrangement, education, income level, health status, and religious belief were collected at baseline. Primary outcomes included self-reported level of loneliness, social connectedness, resilience, and national identity. Loneliness was assessed by the 8-item UCLA Loneliness Scale (ULS) (Hays and DiMatteo, 1987), with higher scores representing a greater sense of loneliness (Baseline Cronbach's $\alpha = 0.83$). Social connectedness was measured by the 8-item Social Connectedness Scale (SCS) (Lee and Robbins, 1995), with higher scores reflecting greater connectedness (Baseline Cronbach's $\alpha = 0.92$). Resilience was assessed by the 11-item Ego-Resilience Revised Scale (ER-11) (Farkas and Orosz, 2015), with higher scores corresponding to greater trait resilience (Baseline Cronbach's $\alpha = 0.83$). The ER-11 assesses three domains of resilience, including active engagement with the world, problem solving strategies and integrated performance under stress (Farkas and Orosz, 2015). Finally, National Identity was assessed by the 15-item National Identity Scale (NATID) (Baseline Cronbach's $\alpha = 0.73$). NATID assesses multiple domains of national identity including national heritage, culture homogeneity and belief system (Keillor et al., 1996). The ULS-8, ER-11, SCS, and the NATID possessed internal validity, reliability, and cross-cultural applicability.

Secondary Outcomes included self-reported levels of quality of life, life satisfaction, life meaning, compassion and social support. Quality of life was measured by the 8-item WHO Quality of Life Scale-8 (EUROHIS-QoL-8) (Rocha et al., 2012) (Baseline Cronbach's $\alpha = 0.77$). Life satisfaction was assessed by the single-item Satisfaction with Life Scale (SWLS) (Cheung and Lucas, 2014). The 8-item presence of meaning subscale from the Meaning in Life Questionnaire (MLQ) was used to measure the participant's sense of meaning in life (Steger et al., 2006) (Baseline Cronbach's $\alpha = 0.92$). Sense of compassion toward others was evaluated with the 5-item Santa Clara Brief Compassion Scale (SCBCS) (Hwang et al., 2008) (Baseline Cronbach's $\alpha = 0.76$). Social support was measured with three subscales from

FIGURE 1 | Sample art mediums for the ARTISAN intervention.

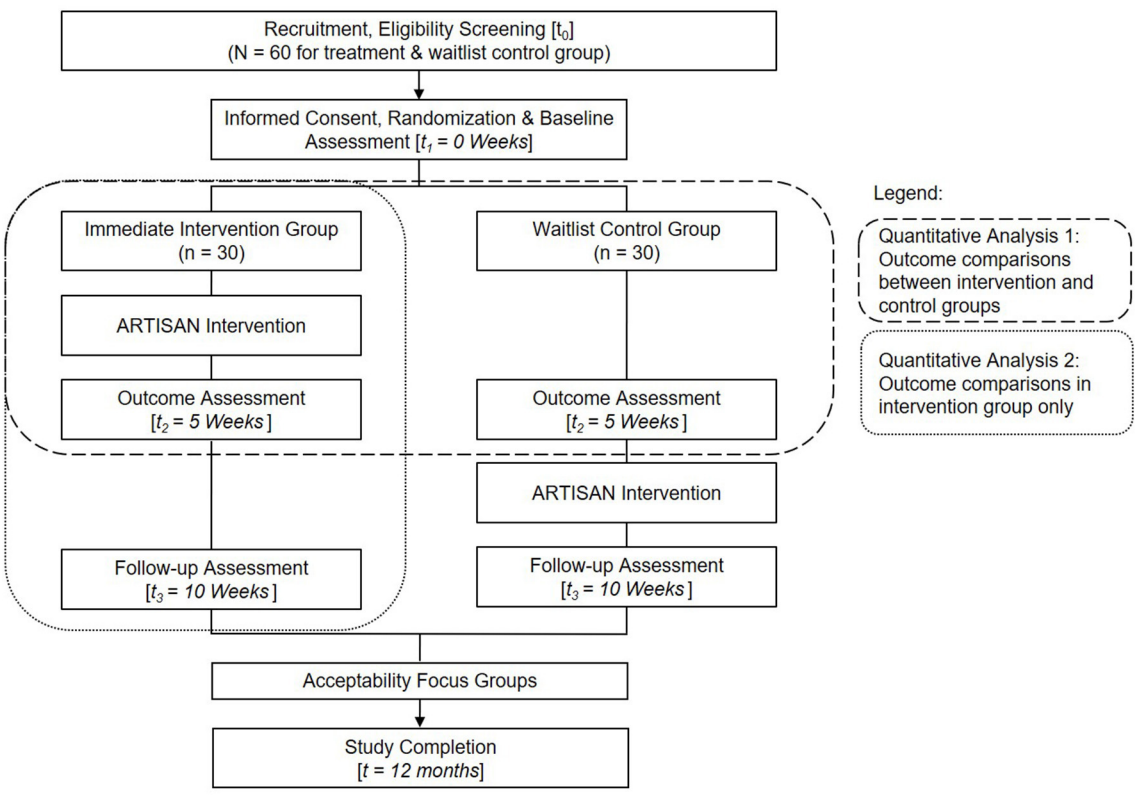

FIGURE 2 | Study flow diagram.

the Medical Outcomes Study Social Support Survey (MOS-SS) (Sherbourne and Stewart, 1991), specifically, the 8-item Emotional/Informational Support subscale, the 4-item positive social interactions as well as the 3-item affectionate support subscale was utilized. For each secondary outcome measure, higher overall scores represented a greater degree of quality of

TABLE 1 | ARTISAN intervention framework.

Session	Intervention themes and components
Week 1	**Theme I: Discovering our National Heritage** → Curated Gallery/Museum Tour: Docent conducts a short tour with participants, focusing on three selected heritage artifacts that tell stories of national traditions and pastime with food and play as a starting point for reflections and discussions (45 mins). → Collaborative Art making and Storytelling: Transiting from Singapore's Stories, ARTISAN facilitators encourage dyads to share their personal stories of growing up, and together, create art that symbolizes the meaning of being a Singaporean [Art Materials: Dry Clay] (90 mins)/Break. → Reflective Writing & Group Sharing: Dyads engage in a guided reflective writing segment to document their experiences, thereafter, share their ideas with the rest of the group (30 mins).
Week 2	**Theme 2: Strengthening Social Bonds** → Curated Gallery/Museum Tour: Docent conducts a short tour with participants, focusing on three selected heritage artifacts that tell stories of social connections (45 mins). → Collaborative Art making and Storytelling: Transiting from Singapore's Stories, ARTISAN facilitators encourage dyads to share their personal stories of friendships, and together, create art that symbolizes unity [Art Materials: Canvas & Acrylic] (90 mins)/Break. → Reflective Writing & Group Sharing: Dyads engage in a guided reflective writing segment to document their experiences, thereafter, share their ideas with the rest of the group (30 mins).
Week 3	**Theme 3: Overcoming Adversities and Resilience** → Curated Gallery/Museum Tour: Docent conducts a short tour with participants, focusing on three selected heritage artifacts that tell stories of a nation's resilience (45 mins). → Collaborative Art making and Storytelling: Transiting from Singapore's Stories, ARTISAN facilitators encourage dyads to share their personal stories of overcoming adversities, and together, create art that symbolizes personal resilience. [Art Materials: Beads & Bracelets] (90 mins)/Break. → Reflective Writing & Group Sharing: Dyads engage in a guided reflective writing segment to document their experiences, thereafter, share their ideas with the rest of the group. (30mins)
Week 4	**Theme 4: Building our Dreams and Aspirations** → Curated Gallery/Museum Tour: Docent conducts a short tour with participants, focusing on three selected heritage artifacts that tell stories of hope and progression. (45mins) → Collaborative Art making and Storytelling: Transiting from Singapore's Stories, ARTISAN facilitators encourage dyads to share their dreams for the nation, create art that symbolizes their future aspirations for Singapore [Art Materials: Recycle Materials] (90 mins)/Break. → Reflective Writing & Group Sharing: Dyads engage in a guided reflective writing segment to document their experiences, thereafter, share their ideas with the rest of the group (30 mins).
Week 5	**Theme 5: Sharing our Stories and Legacies** → Creative Writing: Reflecting on the experiences from the previous 4 weeks as well as all the art pieces that were created, dyads are asked to engage in a series of reflective and creative writing to elucidate their arts as well as their personal learnings (60 mins). → Mini Art–Exhibition: Dyad's artworks and creative writings are showcased to all group members, as well as members of the community in a mini ARTISAN exhibition. Participants are allocated time to creatively display their creations and prepare a short writeup for their artworks (45 mins)/Break. → Group Sharing and Debrief: As a closure to the 5–week ARTISAN program, dyads are provided with an open platform to verbally share their arts, stories, writings as well as words of gratitude and wisdom to the rest of the group. Closing reflections and remarks by ARTISAN facilitators (60 mins).

life, life satisfaction, life meaning, compassion and social support. Again, these scales possessed internal validity, reliability, and cross-cultural applicability.

Qualitative Measures

Weekly group discussions were audio recorded and transcribed verbatim. In addition, the written responses of the participant's reflective journal of the intervention were documented. The reflective journal included guiding questions such as "what is my favorite part of this session" or "what have I learnt about my partner today." The implementation and delivery of ARTISAN was assessed through qualitative feedback from facilitators throughout the sessions, as well as a feasibility focus group at the end of the intervention. Implementation information including the attendance and drop-out rates, reasons for attrition, deviations from the intervention protocol and uncompleted interventions and the reasons were also documented. To protect the confidentiality of the participants, identifying information were removed and pseudo-names were assigned to each participant on the transcripts before analysis.

Data Analyses

Quantitative data was entered, stored, and analyzed using Stata 14.2 (StataCorp, College Station, TX, USA) statistical analysis software. Baseline demographic characteristics between intervention and waitlist control groups are presented either number (%) for categorical variables or mean (SD: standard deviation) for quantitative variables. The intervention group and waitlist control group were compared on the primary outcomes and secondary outcomes. To examine the changes in continuous outcome variables over time, linear mixed effects models were fitted separately for each outcome. Models were adjusted for baseline demographic variables (age, gender, ethnicity, education,

marital status, employment, income, type of residence, and self-reported chronic illness). Estimated change with 95% confidence interval (CI) were reported throughout in this manuscript. Interaction between study groups and time were also explored and reported (considered significant if $p < 0.1$). Exploratory subgroup analyses were also conducted for youth and senior groups. Longitudinal analysis was also performed for the intervention group with an additional time-point. All p-values were based on two-tailed tests of significance and those <0.05 were considered to be statistically significant. Qualitative data was managed by the QSR NVIVO software package. Weekly group sharing and focus group discussions were audio recorded, transcribed verbatim and verified by research team members. Written responses from the participant's reflective journal was anonymized and keyed into an excel database. The qualitative data collected was utilized to provide insights to the quantitative findings. To maximize credibility, criticality and authenticity, strategies such as theory triangulation, research triangulation as well as member checking were adopted and exercised throughout the analytical process.

RESULTS

Participant Demographics

70 participants were initially recruited and randomly paired. However, there were two dropouts due to health reasons, resulting in a final sample of 68 participants. Arrangements were made for affected participants, where replacements or triads were formed. Older adults in this study were aged between 60 and 83 ($M = 73.1$, SD = 6.53), predominantly female (82.4%) and Chinese (100%). Youth participants were aged between 19 and 29 ($M = 22.20$, SD = 2.34), mostly female (76.5%) and Chinese (92%). There were no statistically significant differences in demographic measures between intervention group and control group. For more information regarding the demographic information of the participants, please refer to **Table 2**.

Quantitative Findings

Overall Quantitative Findings

Details of the linear mixed modeling analyses can be found in **Table 3**. Between-group linear mixed model analyses revealed that participants in the ARTISAN group experienced significant increase in life satisfaction compared to participants in the waitlist-control group (3.08 vs. 3.45; 95% CI: 0.22 to 0.77, $p < 0.001$, Cohen's $d = 0.53$) immediately after completion of ARTISAN. The findings also revealed that participants in the control group experienced a significant increase in emotional support at the second baseline (3.23 vs. 3.60; 95% CI: −0.77 to −0.07, $p = 0.018$, $d = 0.08$) despite no significant changes in emotional support scores of participants in the ARTISAN group, an unexpected result from the analyses. Within-group linear mixed model analyses reveal that at 5-weeks follow-up, intervention group participants experienced significantly elevated levels of life satisfaction (3.06 vs. 3.29; 95% CI: 0.04 to 0.42, $p = 0.017$, $d = 0.47$), further significant improvement in resilience (5.17 vs. 5.48; 95% CI: 0.07 to 0.55, $p = 0.011$, $d = 0.46$), as well as a significant reduction in loneliness (2.12 vs. 1.91; 95% CI: −0.34 to −0.08, $p = 0.001$, $d = 0.61$) compared to baseline. In addition, significant improvements were also observed in multiple resilience domains across time among intervention group participants, including performance under stress (5.21 vs. 5.54; 95% CI: 0.04 to 0.62, $p = 0.025$, $d = 0.44$), active engagements with the world (5.04 vs. 5.39; 95% CI: 0.003 to 0.71, $p = 0.048$, $d = 0.33$). These findings reflect the robust maintenance and positive residual effects of the ARTISAN intervention.

Quantitative Findings by Age Group (Youth)

Due to the differences in education levels, developmental stages and cohort effects between the youth and older adult groups, subgroup analyses were conducted to explore the effects of ARTISAN on each age group. Details of the exploratory linear mixed modeling analyses can be found in **Tables 4**, **5**. It is important to note that the findings for subgroup analyses are exploratory in nature and more research is required to ascertain the promising results from the subgroup analyses. Between-group linear mixed model analyses with youth participants reveal that compared to waitlist-control, intervention group participants experienced significant increase in quality of life (4.00 vs. 4.21; 95% CI: 0.16 to 0.52, $p < 0.001$, $d = 1.31$), life satisfaction (2.98 vs. 3.31; 95% CI: 0.09 to 0.85, $p = 0.015$, $d = 0.68$), and self-reported national identity (3.90 vs. 4.23; 95% CI: 0.18 to 0.80, $p = 0.002$, $d = 0.44$), and national heritage, a subscale of national identity (4.60 vs. 5.21; 95% CI: 0.19 to 1.47, $p = 0.011$, $d = 0.83$) upon ARTISAN completion. The findings also revealed that youth participants in the control group experienced a significant reduction in compassion at the second baseline (5.70 vs. 5.23; 95% CI 0.18 to 1.03, $p = 0.005$, $d = 0.67$) despite no significant changes in compassion scores of participants in the ARTISAN group, another unexpected result from the analyses. Within-group linear mixed model analyses show that at 5-week follow-up, youths in intervention group not only experienced significantly elevated levels of quality of life and life satisfaction, but also further enhancements in affectionate support (3.81 vs. 4.09; 95% CI: 0.03 to 0.53, $p = 0.028$, $d = 0.47$) and emotional support (3.66 vs. 4.01; 95% CI: 0.10 to 0.59, $p = 0.005$, $d = 0.57$) compared to baseline. Moreover, significant reduction in loneliness was observed for intervention group youths at 5-weeks follow-up compared to baseline (2.25 vs. 2.06; 95% CI: −0.34 to −0.05, $p = 0.010$, $d = 0.48$). Finally, although there were significant improvements in reported national identity and national heritage scores immediately post intervention, there was a significant drop at 5-week post-intervention. Also, despite the increase in reported problem-solving skills from the ER11 subscale immediately after intervention, there was a significant decrease 5-weeks post-intervention. These findings reflect the effectiveness of the ARTISAN intervention in uplifting youths' quality of life and sense of social wellness and provides evidence for more booster sessions.

Quantitative Findings by Age Group (Older Adults)

Older adults recruited for the pilot study were observed to be active members of their communities, and thus they possessed relatively high levels of well-being. Nonetheless, between-group

TABLE 2 | Participant demographic information.

Demographic characteristic	Intervention		Waitlist control	
	Youth ($n = 18$)	Older Adult ($n = 17$)	Youth ($n = 16$)	Older Adult ($n = 17$)
	Mean (SD) or *N* (%)			
Age in years, Mean (SD)	22.7 (2.79)	72.6 (7.56)	21.6 (1.59)	73.6 (5.50)
Gender (Female)	15 (83.3)	14 (82.4)	11 (68.8)	14 (82.4)
Presence of chronic illness (Yes)	1 (5.6)	13 (76.5)	0 (0)	8 (47.1)
Marital status				
Single/divorced/widowed	17 (94.4)	7 (41.2)	16 (100)	4 (23.5)
Married	1 (5.6)	10 (58.8)	0 (0)	13 (76.5)
Highest obtained education				
Up to Primary/Elementary School	–	11 (64.7)	–	14 (82.3)
Secondary/High School or above	18 (100)	6 (35.3)	16 (100)	3 (17.6)
Employment status				
Full–time/part–time employed	3 (16.7)	2 (11.8)	2 (12.6)	3 (17.6)
Unemployed or retired	15 (83.3)	15 (88.2)	14 (87.4)	14 (82.4)
Monthly household income (SGD)[a]				
<2,000	4 (22.3)	15 (88.2)	5 (31.3)	17 (100)
≥2,000	10 (55.6)	1 (5.9)	10 (62.5)	–
Undisclosed	4 (22.2)	1 (5.9)	1 (6.3)	–
Housing type				
Public housing (1/2/3–room flat)	1 (5.6)	12 (70.6)	1 (6.3)	10 (58.8)
Public housing (4/5–room flat)	10 (55.6)	4 (23.5)	11 (68.8)	5 (35.3)
Private housing (e.g., Condominium)	7 (38.9)	1 (5.9)	4 (25.1)	1 (5.9)

[a] *SGD, Singapore Dollar.*

linear mixed model analyses show that ARTISAN was still effective in enhancing the life satisfaction (3.14 vs. 3.54; 95% CI: 0.12 to 0.94, $p = 0.011$, $d = 0.48$) among older adults in the intervention as compared to those in the controlled group. Moreover, the findings revealed that participants in the control group experienced a significant increase in emotional support (3.08 vs. 3.57; 95% CI: −1.33 to −0.16, $p = 0.013$, $d = 0.10$), as well as affectionate support (3.39 vs. 3.96; 95% CI: −1.51 to −0.22, $p = 0.009$, $d = 0.38$) at the second baseline despite no significant changes in social support scores of participants in the ARTISAN group, yet another unexpected result from the analyses. Within-group linear mixed model analyses further reveal that at 5-weeks follow-up, older adults in the intervention further experienced significant reduction in loneliness (1.97 vs. 1.75; 95% CI: −0.44 to −0.02, $p = 0.034$, $d = 0.83$) and enhanced resilience (5.04 vs. 5.65; 95% CI: 0.19 to 1.04, $p = 0.005$, $d = 0.80$) as compared to baseline. Moreover, significant improvements were also observed in multiple resilience domains across time, including integrated performance under stress (5.18 vs. 5.82; 95% CI: 0.16 to 1.13, $p = 0.009$, $d = 1.02$) and active engagements with the world (4.73 vs. 5.51; 95% CI: 0.16 to 1.39, $p = 0.014$, $d = 0.62$). However, a significant reduction in life satisfaction among intervention group participants from immediately post-intervention to 5-weeks follow-up (3.59 vs. 3.30; 95% CI: −0.58 to −0.01, $p = 0.044$, $d = 0.50$), highlighted the potential need for booster sessions and/or other activities such as volunteering as ARTISAN facilitators to sustain meaningful engagement.

Qualitative Findings

The qualitative data from the reflective writing and group sharing among the ARTISAN participants provided further insights to the intervention's efficacy in citizen empowerment and loneliness alleviation. The narratives of the youth-elder dyads eloquently described the intervention's ability to enhance intergenerational connections, foster nationhood, encourage resilience and capacity building.

Intergenerational Connections

The multi-modal nature of the intervention, amalgamating art-space, art-making and intergenerational storytelling encouraged intergenerational dialogue and provided participants with a safe platform for age stereotypes to be challenged, as well as mutual understanding and respect to be fostered among the participants. For instance, a 79-year-old female participant shared that she was "*very happy being able to meet new friends, (and she) could learn art-related skills,… interact with others and recollect past stories with other people*." Another 70-year-old female participant explained that the invention bridged the "*generational gap, so (they) can communicate very well*." A 19-year-old female participant further elaborated that ARTISAN "*was positive and it is quite meaningful as (she) was able to interact with the older generation more. [ARTISAN] changed (her) views of the older generation. Previously, (she) thought that they were hard to get along with but now, just like youths, they are easy to get along with*

TABLE 3 | Outcome comparisons between intervention and control groups using linear mixed models.

Outcome measures	Intervention ($N = 35$)			Control ($N = 33$)			Intervention vs. Control		
	Adjusted baseline mean (95% CI)	Change from baseline (95% CI)	*P*–value	Adjusted baseline mean (95% CI)	Change from baseline (95% CI)	*P*–value	Adjusted difference (95% CI)	*P*–value	P–interaction (group × time)
Primary outcomes									
Loneliness (ULS-8)	2.09 (1.94 to 2.23)	−0.04 (−0.17 to 0.10)	0.581	2.25 (2.10 to 2.40)	−0.14 (−0.28 to 0.002)	0.053	−0.16 (−0.38 to 0.05)	0.133	0.316
Social Connectedness (SCS)	4.63 (4.29 to 4.97)	0.12 (−0.21 to 0.46)	0.472	4.55 (4.20 to 4.90)	−0.12 (−0.46 to 0.23)	0.507	0.07 (−0.42 to 0.57)	0.771	0.329
Ego–Resilience (ER)	5.18 (4.88 to 5.49)	0.16 (−0.07 to 0.40)	0.170	5.03 (4.72 to 5.35)	0.10 (−0.14 to 0.34)	0.418	0.15 (−0.29 to 0.60)	0.504	0.707
National Identity Scale (NATID)	4.38 (4.16 to 4.59)	0.11 (−0.14 to 0.36)	0.377	4.37 (4.15 to 4.59)	0.03 (−0.23 to 0.29)	0.821	0.005 (−0.31 to 0.32)	0.976	0.651
Secondary outcomes									
Quality of Life (EUROHIS-QoL-8)	4.01 (3.83 to 4.19)	0.08 (−0.09 to 0.24)	0.351	3.83 (3.64 to 4.01)	−0.05 (−0.22 to 0.11)	0.525	0.18 (−0.08 to 0.45)	0.165	0.269
Life Satisfaction	3.08 (2.91 to 3.26)	0.37 (0.18 to 0.56)	<0.001	3.25 (3.07 to 3.43)	−0.12 (−0.32 to 0.07)	0.210	−0.17 (−0.43 to 0.09)	0.193	<0.001
Life Meaning (MLQ)	5.42 (5.02 to 5.82)	0.19 (−0.16 to 0.55)	0.288	4.93 (4.52 to 5.33)	0.23 (−0.15 to 0.59)	0.233	0.49 (−0.09 to 1.08)	0.097	0.907
Compassion (SCBCS)	5.57 (5.24 to 5.90)	0.01 (−0.29 to 0.30)	0.969	5.60 (5.25 to 5.94)	−0.20 (−0.50 to 0.10)	0.193	−0.03 (−0.52 to 0.46)	0.918	0.337
Emotional Support (MOS-SS)	3.66 (3.38 to 3.95)	−0.05 (−0.30 to 0.19)	0.667	3.23 (2.94 to 3.53)	0.37 (0.12 to 0.62)	0.004	0.43 (0.01 to 0.85)	0.044	0.018
Positive Social Interaction (MOS-SS)	3.84 (3.61 to 4.07)	0.02 (−0.18 to 0.22)	0.834	3.47 (3.23 to 3.71)	0.29 (0.08 to 0.50)	0.006	0.37 (0.02 to 0.71)	0.036	0.067
Affectionate Support (MOS-SS)	3.78 (3.48 to 4.07)	−0.05 (−0.32 to 0.23)	0.734	3.53 (3.22 to 3.84)	0.29 (0.01 to 0.58)	0.042	0.25 (−0.19 to 0.69)	0.269	0.090

CI, confidence interval; models adjusted for age, gender, ethnicity, education, marital status, employment, income, type of residence, and self-reported chronic illness.

when (she) get to know them." The guided storytelling and art-making activities at the museum space also promoted learning and communication among participants, as this 83-year-old male participant mentioned that "*(he) enjoyed making new friends and sharing (his) interests/hobbies to (his younger) partner. It was very fun talking to university students. It made (him) feel young again… (He) enjoyed interacting with the community, otherwise (he) would be very lonely*." Similarly, a 23-year-old female participant also expressed that "*these five weeks has taught (her) how to better communicate with the elderly and not to disregard their differences but to celebrate them. It has also made (her) aware of how different the times were when they were growing up and made (her) more appreciative*." The effects of ARTISAN extended beyond the art-space as participants were more appreciative of the people around them and were motivated to connect with others in their community.

Enhanced Nationhood

The weekly themes and curated artifacts provided a foundation for discussion between dyads and provided them with a platform to share their personal experiences. Supporting the quantitative findings, youth participants expressed a greater appreciation for the nation's unique history and heritage as the older adults brought the artifacts to life by sharing their lived experiences. A 22-year-old female participant "*realized the importance of individual stories. (Although) visiting the museum was not a foreign experience for (her), it has only been during ARTISAN that the history became significant and important."* Echoing similar sentiments, another 21-year-old female participant said that she "*really enjoyed learning about the history of Singapore through personal encounters of the elderly – it makes the historical stories so much more interesting and valuable*." Older participants enjoyed reminiscing about past experiences with the younger participants. By exchanging stories and experiences with other group members, ARTISAN participants developed greater understanding and appreciation toward their culture, heritage, and history. An 82-year-old female participant shared that the tours brought her new perspectives, "*during the gallery tour, (she) now understood things from many years ago (that she did not understand then) … also, (she was able) to reminiscence the times that (she) remembered as a kid all the way till now*." In addition, an 80-year-old female participant created an art piece with her youth partner that "*represents Singapore in the past and present, and that although the buildings and infrastructure have changed, the roots and spirit of the people remain the same across generations*", highlighting strengthened shared identity among ARTISAN participants.

Resilience and Capacity Building

Insights to the improvement in resilience scores could be explained by the novel ARTISAN experience, where participants had to navigate through the new themes, art materials and techniques together with their partners on a weekly basis. This process sparked creativity, challenged current ways of thinking and encouraged new solutions to solve problems. Some participants, such as this 60-year-old female, "*enjoyed all the activities because they made (her) think and reflect on certain*

TABLE 4 | Separate subgroup analysis for youth and older adults between intervention and control groups using linear mixed models/.

Outcome measures	Intervention			Control			Intervention vs. control		
	Adjusted baseline mean (95% CI)	Change from baseline (95% CI)	*P*-value	Adjusted baseline mean (95% CI)	Change from baseline (95% CI)	*P*-value	Adjusted difference (95% CI)	*P*-value	P–interaction (group × time)
Youth (*N* = 34)									
Primary outcomes									
Loneliness (ULS−8)	2.27 (2.06 to 2.49)	−0.14 (−0.26 to −0.03)	0.016	2.41 (2.19 to 2.64)	−0.14 (−0.26 to −0.13)	0.030	−0.14 (−0.47 to 0.18)	0.390	0.941
Social Connectedness (SCS)	4.67 (4.17 to 5.18)	−0.01 (−0.42 to 0.39)	0.946	4.17 (3.63 to 4.71)	−0.03 (−0.46 to 0.40)	0.894	0.50 (−0.27 to 1.26)	0.201	0.960
Ego–Resilience (ER)	5.30 (4.91 to 5.69)	0.16 (−0.06 to 0.39)	0.159	4.90 (4.48 to 5.31)	−0.10 (−0.34 to 0.14)	0.432	0.40 (−0.20 to 1.00)	0.188	0.124
National Identity Scale (NATID)	3.90 (3.61 to 4.20)	0.33 (0.12 to 0.55)	0.002	4.12 (3.80 to 4.44)	−0.16 (−0.39 to 0.07)	0.164	−0.22 (−0.67 to 0.24)	0.347	0.002
Secondary outcomes									
Quality of Life (EUROHIS-QoL-8)	4.00 (3.74 to 4.25)	0.22 (0.09 to 0.34)	0.001	3.72 (3.44 to 3.99)	−0.13 (−0.26 to 0.003)	0.056	0.28 (−0.12 to 0.67)	0.161	<0.001
Life Satisfaction	2.98 (2.73 to 3.23)	0.33 (0.07 to 0.59)	0.012	3.03 (2.77 to 3.30)	−0.14 (−0.41 to 0.14)	0.335	−0.05 (−0.43 to 0.33)	0.792	0.015
Life Meaning (MLQ)	5.29 (4.75 to 5.84)	0.24 (−0.13 to 0.62)	0.203	4.98 (4.40 to 5.56)	−0.22 (−0.62 to 0.18)	0.272	0.31 (−0.52 to 1.14)	0.460	0.094
Compassion (SCBCS)	5.75 (5.30 to 6.20)	0.13 (−0.16 to 0.42)	0.369	5.70 (5.22 to 6.18)	−0.47 (−0.78 to −0.17)	0.003	0.05 (−0.64 to 0.73)	0.891	0.005
Emotional Support (MOS-SS)	3.61 (3.19 to 4.04)	0.14 (−0.11 to 0.39)	0.283	3.38 (2.93 to 3.84)	0.25 (−0.02 to 0.51)	0.074	0.23 (−0.42 to 0.88)	0.484	0.573
Positive Social Interaction (MOS-SS)	3.86 (3.51 to 4.22)	0.14 (−0.11 to 0.39)	0.271	3.41 (3.04 to 3.79)	0.24 (−0.02 to 0.50)	0.073	0.45 (−0.09 to 0.99)	0.100	0.583
Affectionate Support (MOS-SS)	3.80 (3.33 to 4.27)	0.19 (−0.08 to 0.46)	0.179	3.66 (3.17 to 4.16)	0.004 (−0.29 to 0.29)	0.998	0.14 (−0.57 to 0.85)	0.705	0.358
Older adult (*N* = 34)									
Primary outcomes									
Loneliness (ULS-8)	1.93 (1.71 to 2.15)	0.07 (−0.17 to 0.32)	0.567	2.06 (1.84 to 2.28)	−0.14 (−0.38 to 0.11)	0.269	−0.13 (−0.45 to 0.20)	0.446	0.235
Social Connectedness (SCS)	4.50 (4.01 to 4.99)	0.27 (−0.28 to 0.81)	0.336	4.99 (4.50 to 5.48)	−0.20 (−0.74 to 0.34)	0.474	−0.49 (−1.22 to 0.24)	0.189	0.235
Ego–Resilience (ER)	5.03 (4.51 to 5.55)	0.17 (−0.24 to 0.58)	0.430	5.19 (4.67 to 5.71)	0.28 (−0.13 to 0.70)	0.179	−0.16 (−0.94 to 0.61)	0.679	0.694
National Identity Scale (NATID)	4.82 (4.47 to 5.17)	−0.12 (−0.56 to 0.32)	0.585	4.66 (4.31 to 5.00)	0.21 (−0.23 to 0.65)	0.352	0.16 (−0.35 to 0.67)	0.542	0.297
Secondary outcomes									
Quality of Life (EUROHIS-QoL-8)	3.94 (3.71 to 4.18)	−0.07 (−0.37 to 0.23)	0.656	4.01 (3.78 to 4.25)	0.01 (−0.29 to 0.31)	0.924	−0.07 (−0.42 to 0.27)	0.680	0.702
Life Satisfaction	3.14 (2.88 to 3.39)	0.41 (0.12 to 0.70)	0.005	3.51 (3.25 to 3.77)	−0.12 (−0.41 to 0.17)	0.426	−0.37 (−0.76 to 0.01)	0.055	0.011
Life Meaning (MLQ)	5.46 (4.92 to 5.99)	0.14 (−0.45 to 0.73)	0.641	4.97 (4.42 to 5.50)	0.65 (0.05 to 1.24)	0.032	0.49 (−0.31 to 1.28)	0.228	0.237
Compassion (SCBCS)	5.39 (4.86 to 5.92)	−0.13 (−0.63 to 0.37)	0.612	5.48 (4.95 to 6.01)	0.06 (−0.44 to 0.56)	0.818	−0.08 (−0.87 to 0.70)	0.834	0.602
Emotional Support (MOS-SS)	3.71 (3.30 to 4.13)	−0.26 (−0.67 to 0.16)	0.224	3.09 (2.67 to 3.50)	0.49 (0.07 to 0.90)	0.022	0.63 (0.01 to 1.25)	0.048	0.013
Positive Social Interaction (MOS-SS)	3.72 (3.41 to 4.03)	−0.10 (−0.42 to 0.22)	0.527	3.62 (3.30 to 3.93)	0.34 (0.02 to 0.66)	0.037	0.10 (−0.37 to 0.57)	0.669	0.055
Affectionate Support (MOS-SS)	3.76 (3.34 to 4.18)	−0.29 (−0.75 to 0.16)	0.208	3.39 (2.97 to 3.82)	0.57 (0.11 to 1.03)	0.015	0.37 (−0.25 to 0.99)	0.247	0.009

CI, confidence interval; models adjusted for age, gender, ethnicity, education, marital status, employment, income, type of residence, and self–reported chronic illness.

TABLE 5 | Separate subgroup analysis for youth and older adults in intervention group only using linear mixed models.

Outcome measures	Youth (*N* = 18)				Older adult (*N* = 17)			
	(T1 vs. T2)		(T1 vs. T3)		(T1 vs. T2)		(T1 vs. T3)	
	Adjusted diff. (95% CI)	*P*-value	Adjusted diff. (95% CI)	*P*-value	Adjusted diff. (95% CI)	*P*-value	Adjusted diff. (95% CI)	*P*-value
Primary outcomes								
Loneliness (ULS−8)	−0.14 (−0.29 to 0.003)	0.055	−0.19 (−0.34 to −0.05)	0.010	0.07 (−0.14 to 0.28)	0.505	−0.23 (−0.44 to −0.02)	0.034
Social Connectedness (SCS)	−0.01 (−0.35 to 0.32)	0.935	0.09 (−0.24 to 0.42)	0.593	0.27 (−0.27 to 0.80)	0.327	0.44 (−0.10 to 0.97)	0.109
Ego–Resilience (ER)	0.16 (−0.03 to 0.36)	0.099	0.02 (−0.17 to 0.22)	0.809	0.17 (−0.26 to 0.59)	0.444	0.61 (0.19 to 1.04)	0.005
National Identity Scale (NATID)	0.33 (0.13 to 0.53)	<0.001	0.07 (−0.13 to 0.27)	0.493	−0.12 (−0.59 to 0.34)	0.607	−0.08 (−0.54 to 0.39)	0.750
Secondary outcomes								
Quality of Life (EUROHIS-QoL-8)	0.22 (0.10 to 0.33)	<0.001	0.17 (0.06 to 0.28)	0.002	−0.07 (−0.40 to 0.26)	0.685	0.08 (−0.25 to 0.41)	0.631
Life Satisfaction	0.33 (0.09 to 0.58)	0.007	0.33 (0.09 to 0.58)	0.007	0.41 (0.13 to 0.70)	0.005	0.12 (−0.17 to 0.40)	0.421
Life Meaning (MLQ)	0.24 (−0.12 to 0.61)	0.184	0.13 (−0.23 to 0.49)	0.469	0.14 (−0.36 to 0.64)	0.580	0.29 (−0.21 to 0.79)	0.249
Compassion (SCBCS)	0.13 (−0.13 to 0.40)	0.327	0.03 (−0.23 to 0.30)	0.806	−0.13 (−0.63 to 0.37)	0.612	0.25 (−0.25 to 0.75)	0.333
Emotional Support (MOS-SS)	0.14 (−0.11 to 0.38)	0.266	0.35 (0.10 to 0.59)	0.005	−0.26 (−0.59 to 0.08)	0.133	−0.07 (−0.41 to 0.26)	0.667
Positive Social Interaction (MOS-SS)	0.14 (−0.10 to 0.38)	0.250	0.24 (−0.0003 to 0.47)	0.050	−0.10 (−0.45 to 0.25)	0.566	0.10 (−0.25 to 0.45)	0.566
Affectionate Support (MOS-SS)	0.19 (−0.06 to 0.43)	0.144	0.28 (0.30 to 0.53)	0.028	−0.29 (−0.71 to 0.12)	0.162	−0.35 (−0.77 to 0.06)	0.093

CI, confidence interval; T1, baseline, T2, at 5 weeks follow-up; T3, 10 weeks follow-up; models adjusted for age, gender, ethnicity, education, marital status, employment, income, type of residence, and self–reported chronic illness.

issues . . . and think of solutions to these problems." Having to solve problems together as a dyad, a 71-year-old female participant reflected that "*even though the age difference between (her) and the younger generation is large, but (they) can still work together very well. . . (She) also learnt that the youth. . . gave (her) knowledge that (she) didn't know*." Another 83-year-old male participant added that "*the past five weeks were very educational; (he) tried a lot of things that (he) have never done before and . . . (He) learnt that watercolor painting or making art could be a new hobby that (he) enjoys.*" Over the 5-weeks, with the safety of the art-space as well as the encouragement of the art facilitators and partners, participants developed a greater level of confidence and mastery. Especially for older participants who had little exposure to the arts and believed that they had no innate talent to create an art piece, they were hesitant to the creative process at the start of the intervention. By the end of the intervention, participants gained a deeper understanding of their capabilities and were enthusiastic about learning new skills. A 70-year-old female participant felt that she "*can continue progressing . . . to explore new ideas and try new things*." Similarly, a 20-year-old female participant realized that "*there weren't many things (she) tried before, (but) it didn't mean (she) couldn't do them, (she) just needed a little bit of courage to take the first step and explore*." Another 21-year-old female participant revealed that she "*was previously more individualistic and shy. . . now (she) learnt that (she) has the capacity to try out new forms of art and work with someone very different from (her)*."

DISCUSSION

Project ARTISAN was developed to enhance well-being and mitigate the detrimental effects of loneliness and social isolation among the young and old. Utilizing a robust wait-list randomized controlled trial design, the overall quantitative findings from the study revealed that the ARTISAN intervention was effective in enhancing life satisfaction when compared to the waitlist control group. Intervention group participants also experienced improvements in resilience and a reduction in loneliness 5-week after the intervention, reflecting positive residual effects of ARTISAN. Exploratory subgroup analyses were conducted to understand the unique effects of ARTISAN on each age group. In addition to reduced loneliness and enhanced life satisfaction for both age groups, youths experienced further benefit with better quality of life, a greater appreciation for the nation's heritage, as well as an improvement in affectionate and emotional support. Although there may be a ceiling effect in terms of the well-being of older adults in this sample, they reported increased ego-resiliency, specifically, better performance under stress and active engagement with their community. The rich qualitative data also provided strong support and insights to the intervention's effects of building social connections, nationhood, and resilience. The development and implementation of this multi-modal intergenerational intervention was effective in bridging the disconnect of age-segregation at the community level. This finding adds robust evidence to the growing literature of arts and heritage-based interventions for health and well-being promotion, particularly for the Southeast Asian context. Furthermore, the development of ARTISAN using a participatory action research approach provided opportunities for research and education, including inter-agency collaborations between policymakers, research institutions, arts and heritage institutions, as well as community agencies, ultimately strengthening the ecosystem of the local community arts scene. Finally, ARTISAN's success in enhancing in life satisfaction, social connections, resilience, and national identity deeply resonated with Fancourt and Finn's (2019) review on arts, heritage and health programs in the WHO European Region which identified a series of generic outcomes including personal growth, social cohesion, community empowerment, identity development and health benefits following arts and culture engagement.

Interpreting the Findings

Benefits of Multiple Modalities and Intervention Components

ARTISAN is an innovative intervention that combined multiple modalities; by carefully integrating the use of museum and heritage spaces, facilitated artmaking, intergenerational contact, and storytelling, the effects from this synergistic interaction may yield greater results. While there are no known studies that documented the effects of such an intervention, the intervention's positive outcomes may be explained by research from various bodies of literature. Firstly, studies on heritage institutions highlighted the many positive health outcomes that museum encounters offer in the community as well as healthcare settings (O'Neill, 2010; Ander et al., 2013). Visiting heritage institutions alleviated experiences of social isolation, and this was due to the therapeutic space which encouraged new experiences, social engagement, self-discovery (Todd et al., 2017). The Museum on Prescription study also provided evidence to show that socially prescribed programs of curated museum visits could generate significant positive improvements in individuals' self-esteem, social wellness and quality of life (Thomson et al., 2018). Furthermore, cultural artifacts selected in the study may be used to activate shared memories which other items could not (Lanceley et al., 2012).

Secondly, research on the arts and health has consistently proven the benefits of arts engagement in various community settings (Stuckey and Nobel, 2010; Noice et al., 2014; Dunphy et al., 2019). Concepts from Positive Psychology may provide some insights to the outcomes of this study. Art challenged participants to understand the world from a different perspective, as well as to discover new ways to express and experience their lives (Compton and Hoffman, 2019). Moreover, the challenge of the artmaking sessions encouraged novel ways of problem solving, perhaps increasing neural networks and brain plasticity (Cohen, 2006; Bolwerk et al., 2014). This process could contribute to the enhanced life satisfaction and resilience identified in the analyses. Additionally, the facilitated artmaking session contents were meticulously designed to offer sufficient scaffolding of skills and hands-on support for participants over the weeks, providing participants with the foundation to innovate (Hogan and Pressley 1997). With the adequate amount of challenge and skill, ARTISAN participants may experience a state of flow, a

highly rewarding experience associated with well-documented positive outcomes (Sarason, 1990; Csikszentmihalyi, 2000).

Thirdly, research on non-familial intergenerational contact has shown favorable outcomes for older adults and youth in the community in terms of identity development, cognitive functioning, emotional and social functioning (Knight et al., 2014; Park, 2014). A systematic review of non-familial intergenerational arts programs in East Asian by Lou and Dai (2017) also yielded encouraging results including reduction in age stereotypes, improved problem-solving skills, strengthened relational bonds, and enhanced well-being. However, the authors highlighted that these interventions were beneficial for older participants and not youth participants. On the contrary, youth participants in the ARTISAN pilot study experienced significant improvements to multiple outcomes. Explanations for these encouraging findings may be explained from a developmental perspective, where ARTISAN was able to provide opportunities for youths to incorporate the "six Cs" for positive youth development including "competence, confidence, connection, character, caring and contribution" (Lerner et al., 2005). Activities that supported these components were found to promote positive outcomes among youths (Benson et al., 2007).

Finally, the creation of self-narratives in ARTISAN nurtured self-discovery, life meaning and was associated with improved well-being (Bryant et al., 2005). The reflections at the end of the intervention helped participants process their experience and develop a renewed sense of meaning. By sharing their experiences in a group setting, participants learnt from others' stories, forming shared narratives, and strengthening bonds. According to Pals (2006), *narrative identity processing* through the construction and sharing of life narratives (such as those in ARTISAN sessions) were identified as a pathway to healthy personality development across the lifespan (McLean et al., 2007). In sum, each component in the ARTISAN intervention was carefully selected based on the merits of the individual modalities to form an integrated arts and heritage program for loneliness alleviation and citizen empowerment, and it was evident that ARTISAN is beneficial to the Singaporean community.

Non-significant and Unexpected Findings

Although older adults expressed an increased social connection and well-being in the qualitative data, these findings were not reflected in the quantitative analyses. This could be due to a ceiling effect that the assessment tools were not able to measure. In this pilot study, older participants were recruited in partnership with a community collaborator, TOUCH Community Services (TCS), a not-for-profit charity organization in Singapore dedicated to meet the needs of the community. Specifically, in 2018, TCS has reached out to over 10,079 older adults and received multiple accolades through their various initiatives such befriending, caregiver support and homecare (Touch Community Services, 2018). Older adults under the care of TCS appeared to be well-integrated in their community as they were active participants of other activities offered by the organization, possibly explaining the high levels of well-being reported at baseline.

In the analyses, there was an unexpected finding where the control group experienced a significant increase in emotional support scores at the second baseline despite no significant changes for the ARTISAN group. The subgroup analyses showed that this finding was significant among the older participants in this study. A potential explanation for this might be due to the community which the participants were recruited from. On the fifth week of the intervention, a public exhibition was held in the community where the older adults reside, and control group participants living in the vicinity may have visited the exhibitions and interacted with ARTISAN participants. By listening to the ARTISAN participant's sharing of gratitude and resilience, some control group participants may have vicariously experienced the effects of ARTISAN. The second baseline assessment for the control group participants was held on the same week as the ARTISAN participants. Also, ARTISAN participants may also have shared with the control group participants about their weekly experiences, potentially contributing to an enhanced emotional support for the control group participants. This finding suggests the far-reaching effects of the ARTISAN intervention in enhancing individual and community well-being. Future research may consider assessing participant's networks and exhibition visitors to understand the effects of ARTISAN on the wider community.

Limitations and Future Research

Being a pilot study, project ARTISAN catered to a select group of older adults from a single community. The older adults for this study were recruited through an established organization highly proficient in providing eldercare support and services for older adults living in the community. This may influence the outcome of ARTISAN administered, thus future research could expand study sites to include hospitals, nursing homes, and specifically, organizations supporting social isolated older adults. Furthermore, the youths were recruited through three out of the many higher education institutions in Singapore. Future studies could expand the recruitment sites to include more education institutions as well as community organizations supporting youth at risk of social isolation that would benefit from the intervention. Moreover, this intervention was implemented in English or Mandarin due to the limited language ability of the research team and facilitators. Although rooted in Asian culture, Singapore is a multiracial and multicultural society with distinctive variants of culture and languages. Also, majority of the older and younger participants in this study were female. Hence, future research could include more male participants and expand the program to be conducted in multiple languages with more heritage institutions, to reach more communities across Singapore. Taken together, this intervention provided the community with a platform to engage in the arts, motivating youths and elders to be exposed to the arts and heritage scene in Singapore, as well as to enjoy the many benefits of arts engagement such as social and cultural integration. This calls for future large-scale implementation of project ARTISAN in the greater community, which could benefit more older adults and youth in the society.

Toward ARTISAN 2.0: Deconstructing the Integrative Efficacy of a Multimodal Intergenerational Art-Based Intervention—Study Protocol of a Five-Arm Randomized Control Trial

The quantitative findings, together with the qualitative narratives and clinical observations of the strong relational bonds that have been formed between youth and elderly participants over 5 weeks of intervention were testaments to ARTISAN's efficacy in enhancing individual well-being and social wellness. Despite these promising results, critics were quick to challenge the multimodal nature of ARTISAN and the efficacy of art-based interventions, raising questions about the effectiveness of the modality (e.g., "How do we know it is the art and heritage that worked?") and intervention components (e.g., "Perhaps we can generate the same results by getting youths and older adults to do other activities since it is all about intergenerational connection?"). These questions confront the holistic and integrative framework of ARTISAN, and suggest that participatory arts engagement, curated art-spaces, and facilitated storytelling, or simply intergenerational contact alone could yield similar results. While each component may yield positive findings, with the careful amalgamation of the strengths of each modality, the effects that stem from such synergistic interaction could yield greater and more impactful results. In other words, a well-integrated whole may well be greater than the sum of its parts. As such, a thorough investigation of specific ARTISAN intervention components is now developed to strengthen understanding of the intervention and provide further evidence on the use of arts and heritage for health promotion and community empowerment.

ARTISAN 2.0: Deconstructing the Integrative Efficacy of a Multimodal Intergenerational Art-based Intervention [ClinicalTrials.gov ID: NCT04548115], seeks to deconstruct the ARTISAN intervention for gaining a deeper understanding of its underlying mechanisms for promoting positive life changes among youth and elder participants living in multiple communities in Singapore. The core objective is to critically investigate and assess the independent and combined efficacy of each key intervention components of ARTISAN's multimodal framework which comprises of guided tours, artmaking and facilitated storytelling segments with youth and older participants. A parallel group, multicentre, randomized controlled trial (RCT) with four treatment groups and one control group will be conducted. Youth and older adults will be recruited from the community via community collaborators and randomized into: (1) full ARTISAN condition (i.e., curated museum tours, intergenerational storytelling and facilitated artmaking), (2) intergenerational participatory arts condition, (3) intergenerational art space (museum engagement) condition, (4) intergenerational storytelling condition, and (5) control condition of physical activity. Similar to the pilot study, participants will be assessed at three time points including baseline [T1], post-intervention [T2] and 10-week follow up [T3] with psychometric measures to assess intervention outcomes, while qualitative focus groups will be conducted to inform program enhancement and implementation.

It is hypothesized that participants in each condition will experience some degree of health and social enhancements such as reduced loneliness, enhanced resilience, psychological well-being, social connectedness, and sense of nationhood. Furthermore, participants in the full ARTISAN, arts engagement, art space and storytelling condition are hypothesized to experience greater health and social enhancements as compared to those in the control condition. Finally, participants in the full ARTISAN condition are predicted to experience the greatest life and social enhancements among participants in all other conditions.

CONCLUSION

In conclusion, the ARTISAN Pilot study has filled a critical gap in knowledge and practice between the arts, health, and citizenship, paving the way for further research in enhancing societal well-being, identity creation and social cohesion. ARTISAN formed the foundation for developing other theoretically-driven and effective intergenerational art-based programs that could be useful for different cohorts of older adults and youths; allowing appropriate social policies, supportive schemes and relevant courses of actions to be established in Singapore and greater Southeast Asia. The proposed ARTISAN 2.0 study will provide a deeper understanding of the underlying health promoting mechanisms of this unique and innovate intervention, allowing the research team to clearly define and delineate the independent and combined efficacy of each therapeutic components. Such understanding would not only enhance the development and refinement of the ARTISAN framework for societal-wide dissemination, but also adds to the limited knowledge base on how integrative modalities of arts and heritage programming can serve to support and improve individual, community and population well-being. Specifically, the merits of participatory arts, museum spaces, and storytelling for enhancing resilience, holistic wellness and nationhood will be elucidated through this important undertaking. The results generated will serve to illuminate the intricate pathways in which arts and heritage can cultivate positive life changes, and at the same time, demystify misconceptions and misinformation about the pivotal roles that arts and heritage play in health promotion. Ultimately, the current study and the proposed study will generate new knowledge, contributing to the advancement of art and health research in Singapore, as well as the advancements in both theories and practices for creative aging, loneliness alleviation and citizen empowerment around the world.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by NTU Institutional Review Board (IRB). The

patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AH, MT, and SM conceptualized and designed the study. AH obtained funding, project supervision and drafted the manuscript. SM was involved in the coordination and implementation of the research study, as well as drafting of the manuscript. AH and SM contributed to the drafting of the manuscript equally. MT delivered the ARTISAN intervention. RB conducted the statistical analysis. All authors contributed to data interpretation, as well as the writing and revision of the manuscript.

FUNDING

The ARTISAN pilot study (Grant no. NAC.GRT.R&D.010.001) and the ARTISAN 2.0 study (Grant no. NAC.GRT.R&D.010.003) are funded by the National Arts Council.

ACKNOWLEDGMENTS

The research team would like to express their heartfelt gratitude to esteemed collaborators: National Museum of Singapore, TOUCH Community Services (TOUCHpoint@AMK 433, TOUCH Seniors Activity Centre @ 162), Nanyang Polytechnic, and Ngee Ann Polytechnic for their steadfast support to project ARTISAN. Moreover, the research team is sincerely grateful to the dedicated staff and student volunteers at the Action Research for Community Health (ARCH) Lab, participating artists and art therapists (Ms. Joanne Lio, Ms. Karen Koh, Ms. Koh Hui Hua), as well as all research participants for their generous contributions to project ARTISAN. The key findings of the ARTISAN pilot study were reported in the 2019 Arts and Culture Research Symposium organized by the National Arts Council Singapore. The brief writeup can be assessed here: https://www.nac.gov.sg/whatwedo/support/research/Research-Main-Page/Research-Events/Arts-and-Culture-Research-Symposium-2019.html.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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frontiers in Psychology

REVIEW
published: 08 September 2021
doi: 10.3389/fpsyg.2021.713818

How Do Music Activities Affect Health and Well-Being? A Scoping Review of Studies Examining Psychosocial Mechanisms

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OPEN ACCESS

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: 24 May 2021
Accepted: 03 August 2021
Published: 08 September 2021

Citation:
Dingle GA, Sharman LS, Bauer Z, Beckman E, Broughton M, Bunzli E, Davidson R, Draper G, Fairley S, Farrell C, Flynn LM, Gomersall S, Hong M, Larwood J, Lee C, Lee J, Nitschinsk L, Peluso N, Reedman SE, Vidas D, Walter ZC and Wright ORL (2021) How Do Music Activities Affect Health and Well-Being? A Scoping Review of Studies Examining Psychosocial Mechanisms. Front. Psychol. 12:713818. doi: 10.3389/fpsyg.2021.713818

Background: This scoping review analyzed research about how music activities may affect participants' health and well-being. Primary outcomes were measures of health (including symptoms and health behaviors) and well-being. Secondary measures included a range of psychosocial processes such as arousal, mood, social connection, physical activation or relaxation, cognitive functions, and identity. Diverse music activities were considered: receptive and intentional music listening; sharing music; instrument playing; group singing; lyrics and rapping; movement and dance; and songwriting, composition, and improvisation.

Methods: Nine databases were searched with terms related to the eight music activities and the psychosocial variables of interest. Sixty-three papers met selection criteria, representing 6,975 participants of all ages, nationalities, and contexts.

Results: Receptive and intentional music listening were found to reduce pain through changes in physiological arousal in some studies but not others. Shared music listening (e.g., concerts or radio programs) enhanced social connections and mood in older adults and in hospital patients. Music listening and carer singing decreased agitation and improved posture, movement, and well-being of people with dementia. Group singing supported cognitive health and well-being of older adults and those with mental health problems, lung disease, stroke, and dementia through its effects on cognitive functions, mood, and social connections. Playing a musical instrument was associated with improved cognitive health and well-being in school students, older adults, and people with mild brain injuries *via* effects on motor, cognitive and social processes. Dance and movement with music programs were associated with improved health and well-being in people with dementia, women with postnatal depression, and sedentary

women with obesity through various cognitive, physical, and social processes. Rapping, songwriting, and composition helped the well-being of marginalized people through effects on social and cultural inclusion and connection, self-esteem and empowerment.

Discussion: Music activities offer a rich and underutilized resource for health and well-being to participants of diverse ages, backgrounds, and settings. The review provides preliminary evidence that particular music activities may be recommended for specific psychosocial purposes and for specific health conditions.

Keywords: music listening, singing, instrumental music, rapping, dance and movement, health, well-being

> *"Music tells us things – social things, psychological things, physical things about how we feel and perceive our bodies – in a way that other art forms can't"* – David Byrne (2012), How Music Works, p. 101.

The body of research on music, health and well-being has developed rapidly in the past decade, yielding dozens of empirical studies, reviews (Daykin et al., 2018; Sheppard and Broughton, 2020), books (MacDonald et al., 2012; Bonde and Theorell, 2018), and journals such as the *Journal of Music, Health and Well-being*, *The Arts in Psychotherapy*, and *Arts and Health*. This work has been summarized in ground-breaking reports such as the UK All Party Parliamentary report on creative health (Gordon-Nesbitt and Howarth, 2020) and the scoping review of the role of the arts in improving health and well-being published by the World Health Organization (Fancourt and Finn, 2019). Despite rapid advances in the field, however, there remain some limitations in the literature which this review seeks to address. First, the term "music" has been used to refer to a range of activities, which are at times poorly defined (Kreutz, 2015). Consider the following examples: personalized music listening for pain management in people with fibromyalgia (Linnemann et al., 2015); group singing for adults with chronic mental health conditions (Williams et al., 2019); a hip-hop project for sexual health promotion in Indigenous school students (McEwan et al., 2013); and dance for Parkinson's (Shanahan et al., 2015). All four are examples of music and health projects yet these activities clearly engage distinct physical, social, and psychological processes to achieve improvements in participants' health and well-being. We need to better articulate what type of music activity we are referring to in studies of "music," and to examine the evidence in relation to the health and well-being effects of specific music activities.

Secondly, research in the music, health and well-being field is often prone to risks of bias arising from methodological issues such as convenience sampling, small sample sizes, lack of control or comparison conditions, and lack of independent assessment (Dingle et al., 2019; Clift, 2020). For these reasons, we will adopt a simple measure of research quality based on guidelines from the British Psychological Society QMiP Guidance for qualitative psychologists (Qualitative Methods in Psychology REF Working Group, 2018) and the Cochrane Risk of Bias 2.0 guidelines (Sterne et al., 2019) for quantitative methods (see Methods section) to ensure that research with a level of quality informs the conclusions of this review.

Third, it is largely unclear *how* such music activities affect health and well-being. That is, what are the processes through which these effects are achieved? It may be the case that different music activities exert their effects through distinct processes. For example, dance for Parkinson's may improve participants' well-being through its effects on gait and synchronized movement whereas music listening for pain management might exert its effect through dampening physiological arousal or providing a distraction. The answers to this important question will help health professionals to make recommendations to individuals and their loved ones about whether a music activity or intervention is likely to help them to manage their health symptoms. Research into the biological mechanisms linking music activities with health and well-being outcomes has been summarized recently. Finn and Fancourt (2018) reviewed 44 studies that involved adults listening to music in clinical and non-clinical settings reported that 13 of 33 biomarkers tested (such as cortisol, blood glucose and immune system measures) were reported to change in response to listening to music, indicating a stress-reducing effect (Finn and Fancourt, 2018). Group singing in low stress conditions such as rehearsals is associated with decreased cortisol while singing in high-stress conditions such as performances has been related to increased cortisol levels (Beck et al., 2000; Schladt et al., 2017). Similarly, group drumming has been associated with a modulation of immune response (Fancourt et al., 2016). Given this existing evidence regarding the biological mechanisms, in this scoping review we will focus instead on the psychological (e.g., emotional, cognitive, behavioral, motor) and social (e.g., bonding, inclusion, identity, cultural) processes that might explain the health and well-being effects of music activities.

In planning the scoping review, we searched for a comprehensive theoretical model that would account for a spectrum of musical activities and health and well-being outcomes, through a range of psychosocial processes. Unfortunately, the field of music, health and well-being lacks a widely established and comprehensive framework (Dingle et al., 2019). Our conceptualization is aligned with the contextual model by Kreutz (2015) showing the beneficial effects of musical activities on well-being and quality of life. According to this model, engagement in a musical activity provides individuals with a new context in which to interact and

the combination of individual and contextual variables evoke self-regulatory processes at conscious and/or subconscious levels. Examples of such processes shown in the model include modifying cognitions, emotions, and actions by strengthened self-regulation. The consequences are often an improvement of psychological well-being and other positive outcomes (Kreutz, 2015). The boundaries of how this works (to what degree, for how long, and for whom) remain unclear and subject to ongoing hypothesis-driven research.

We also drew variables from three other models in developing search terms for the review. The first was the Therapeutic Music Capacities Model (Brancatisano et al., 2020) which links individual properties of music to "therapeutic mechanisms," leading to cognitive, psychosocial, behavioral, and motor benefits. Some of the therapeutic mechanisms specified in the TMCM are conceptually relevant to populations with neurological disorders for whom the model was developed but are rarely assessed as part of music intervention research (e.g., neuroplasticity, mirror neuron systems, auditory motor coupling, and neural entrainment). We adopted other mechanisms that are more commonly assessed in music research as some of our search terms, such as arousal, mood, and memory. Another model that informed the review is the BRECVEMA model (Juslin et al., 2010) which describes eight mechanisms by which music listening influences emotional responses, in addition to cognitive appraisal. BRECVEMA is an acronym for Brain stem reflex, Rhythmic entrainment, Evaluative conditioning, Contagion, Visual imagery, Episodic memory, Musical expectancy, and Aesthetic judgement. This model is most suitable for experimental music listening research, however, it can be argued that some of these mechanisms apply to other music activities (e.g., rhythmic entrainment may occur as part of instrumental music playing, dance, and rapping). A third model that has been applied to health interventions in groups is the social identity approach (Tajfel and Turner, 1986; Turner et al., 1987; Jetten et al., 2014). According to this model, to the extent that participants identify with their group, they may access psychological resources from the group such as support, meaning, control and self-esteem. This model has been shown to explain the health and well-being effects of group singing (Williams et al., 2019; Dingle et al., 2020; Tarrant et al., 2021) and other music activities such as dance and instrumental music groups (Kyprianides and Easterbrook, 2020; Draper and Dingle, 2021). From this model, we drew social connection, self-esteem, and identity as processes.

METHODS

The scoping review was conducted by an interdisciplinary group of academics and students from the Schools of Psychology, Music, Human Movements and Nutrition, Physiotherapy, Business, and hospital based Clinical Research Centers at the University of Queensland during February to December 2020. We formed into small working parties of two to four people, each focusing on one of the eight music activity categories. Reliability was established by two or more members of each working group screening the same 50 abstracts in their category and meeting to ensure that the selection criteria were applied consistently. Following this, the remainder of abstracts were divided up among group members for screening. This process resulted in too many papers for inclusion in the full review, so the authors agreed to re-screen the "included" abstracts by applying our quality criteria to exclude all but the best quality research in each category. Importantly, studies in which the intervention was clearly music therapy or a form of psychotherapy were not included, as these bodies of research have been reviewed elsewhere. The literature search was conducted using nine search engines: CINAHL, Embase, Music Periodicals, PsycInfo, PsycNET, PubMed, Scopus, SPORTDiscus, and Web of Science. Search terms are available from the corresponding author on request. Inclusion criteria were that the papers report on empirical research (not reviews or theoretical papers), published in the English language, involving adult participants, and reporting on a health or well-being measure as well as one or more psychological or social process measures that we refer to as "mechanisms" (note that the authors of the studies did not necessarily regard their study design in this way). For quantitative studies, the following criteria were applied:

a. The study used psychometrically validated measures of a health or well-being outcome and at least one process variable.
b. The study had at least 20 participants per condition[1].
c. If a control or comparison condition was included, allocation of participants to conditions was randomized or a check was done to ensure that the two subgroups were comparable at the start of the study.
d. Assessors were independent of the people delivering the music activity (to avoid demand characteristics on participants' responses).

For studies using qualitative methods, the following quality checks were applied:

e. A description and explanation for the type of analysis was given.
f. There was independence between the facilitators of the music program and those collecting and analyzing the data (or involvement of an independent coder in the analysis).

RESULTS

Overview of the Studies

The number of papers at each stage of the scoping review are shown in **Table 1**. Detailed descriptions of the participants, design and intervention, process measures, health or well-being outcomes, and a summary of the results of each study are

[1]This was based on power calculations showing that a sample of 24 is required for a within subjects (pre-post design) ANOVA to find a small effect size with a power of 0.8; while a total sample of 34 (17–18 in each condition) is required for a two-group comparison ANOVA with two assessment points to find a small effect size with a power of 0.8. Our guideline of 20 per condition was chosen to balance the pragmatics of fitting groups of people into halls and spaces where music activities typically take place with the need to design studies with sufficient power to detect an effect if one existed.

TABLE 1 | Flow of decisions about papers through the abstract screening, quality screening, and full text review process.

	Receptive Music listening	Intentional Music listening	Sharing music (live, recorded)	Solo or group instrument playing	Group singing	Music and movement; dance	Lyrics; rapping	Song-writing; Composition; improvisation	Total
Total entries	2,777	1,546	2,128	1,921	1,886	870	2,785	1,567	15,480
No. after duplicates removed	1,922	1,226	1,478	1,701	1,455	743	1,978	1,280	11,783
No. for full text review	34	35	13	12	146	82	17	11	350
Final no. included	11	12	5	10	14	4	4	3	63

presented in **Supplementary Table 1**. As would be expected, the health and well-being outcomes varied across the musical activity categories. In the receptive music listening studies, pain and indicators of post-operative recovery were common outcomes. In the studies of intentional music listening, pain was again a common outcome, as well as health behaviors such as exercise, symptom checklists and measures of well-being, health related quality of life, and patient satisfaction. In the music sharing studies, outcomes included pain, fatigue, agitated and aggressive behavior, quality of life, and well-being. The instrument playing studies reported health outcomes including cognitive health in older adults, health behaviors, social determinants of health (housing stability and criminal behavior), and well-being. In studies of group singing, the outcomes included mental and physical health, cognitive health, well-being, and quality of life. Studies of movement and dance reported outcomes for cognitive health, healthy weight, mental health, and quality of life. Studies of lyrics and rapping reported outcomes such as mental health and cognitive health. Finally, the studies of music composition, songwriting and improvisation included outcomes such as well-being and cultural determinants of health.

Process measures included arousal, emotion or mood, cognitive measures (e.g., memory, attention), self-esteem/achievement, physical activation, social connection, and identity. Most of the studies in the receptive music listening category and some of the intentional music listening studies reported on psychophysiological measures of arousal, such as blood pressure, heart rate, respiratory rate, and skin conductance. Although these could be viewed as biological measures (which was not the focus of the review or search terms), they are also commonly used in experimental psychological research as indicators of emotional arousal. For this reason, we kept these studies in the review. A summary of the process variables supported by the literature in each musical activity category is presented in **Table 2** and explored in further detail in the following sections.

Receptive Music Listening

There is some conceptual overlap between receptive music listening and intentional music listening (next section). We divided studies into the two categories based on the idea that receptive music listening involved participants being in places where music is playing but they were not involved in the music selection process whereas intentional music listening involved some degree of participant engagement in the choice of music they listened to. Among the receptive listening studies, there were 1,922 abstracts screened, 78 selected for full-text review, of which 11 met the criteria for inclusion (see **Table 1**). Nine studies were conducted in a medical setting and investigated the effects of music listening before, during, or after a medical procedure. These included dental procedures, elective surgery, and breast biopsy. Two studies examined the impact of background music on patients with severe dementia (Götell et al., 2002; Gotell et al., 2009). Methods of receptive listening generally utilized assorted 'background music' that was played for participants. These were described as instrumental or classical (Calcaterra et al., 2014; Franzoi et al., 2016; Kipnis et al., 2016; Seinfeld et al., 2016; Çetinkaya et al., 2018), new age (Kipnis et al., 2016; Téllez et al., 2016), relaxing (Twiss et al., 2006; Nilsson, 2009), or participant selected music (Twiss et al., 2006).

Across the studies in medical settings, health outcomes primarily focused on pain, recovery from operations, and patient satisfaction. The mechanism of these effects appeared to be the reduced levels of anxiety, distress, and increased relaxation among patients listening to background music compared to the control groups, who were generally in silence. Reductions to pain were less clear among children in one study where there were some age-based differences in pain reports, where older children showed more pain amelioration (Calcaterra et al., 2014). This may also have been due to older children being better able to understand the pain scale. In the two studies of older adults with dementia, both publications reported from the same study observing nine patients and carers undertaking a morning routine over three conditions: usual morning care, morning care with familiar background music, and caregiver singing. Results found that background music was related to patient functioning, well-being and decreased aggressive behaviors through its effects on physical activation, increased bodily and on sensory awareness, and a strengthened ability to carry out daily living tasks. Patients showed more agency and playfulness in their interactions with their carers, demonstrating improved social connection and interactions.

Intentional Music Listening

Following screening of 1,226 abstracts, 12 studies met the inclusion criteria for the review of intentional music listening research (described in **Table 1**). Methods of intentional listening across all studies utilized either researcher provided music and/or participant preferred music during the music listening interventions. Intervention lengths varied for each study and

TABLE 2 | Summary of available evidence about the psychosocial mechanisms by which music activities affect health and well-being.

Mechanism	Receptive music listening	Intentional music listening	Shared music listening (live, radio)	Instrumental music playing	Group singing	Lyrics; rapping	Music and movement/ dance	Composition/ songwriting/ improvisation
Physiological arousal	+/–	+/–		+				–
Emotion/mood	+	+	+	+	+	+	+	+
Cognitive (e.g., memory)		+	+	+	+	+	+/–	
Self-esteem/achievement				+	+	+		+
Physical activation	+	+	+	+		+	+/–	
Social connection	+		+	+	+	+	+	+
Identity			+		+	+	+	+

Key: +, studies reviewed showed positive evidence; +/–, some studies reviewed showed positive evidence some studies found no evidence; –, studies reviewed found no evidence; blank means the studies reviewed did not measure this.

ranged from a single session of music listening (e.g., Särkämö et al., 2008) to 6 months (e.g., Clark et al., 2016). The way in which music listening was applied as an intervention was also mixed with some research emphasizing music listening during periods where participants were undergoing treatment or experiencing symptoms (O'Callaghan et al., 2012; Mercadíe et al., 2015), during recovery from health procedures (Särkämö et al., 2008; Drzymalski et al., 2017), or during specific daily activities, such as walking or relaxing (Clark et al., 2016; Helsing et al., 2016).

Health outcomes included pain, fatigue, health behaviors such as exercise, symptom checklists and measures of well-being, health related quality of life, and patient satisfaction. Music listening appeared to produce such outcomes through its effect on emotions regulation where several studies reported a reduction in feelings of distress, including specific measures of depression, anxiety, stress (Särkämö et al., 2008; Helsing et al., 2016; Sorensen et al., 2019); greater feelings of relaxation and nostalgia (Clark et al., 2016; Helsing et al., 2016; Kulibert et al., 2019; Sorensen et al., 2019); improved mood and reduced agitation (Clark et al., 2016; Ihara et al., 2019) (see **Supplementary Table 1**). The duration of these effects is difficult to ascertain due to the varying lengths of follow up across measures and studies. However, one study found that reduced levels of anxiety and pain were sustained for at least 12 h after music listening (Fernando et al., 2019). Several of these studies reported positive emotional effects of music listening compared to a control (no music listening group). However, two studies compared music listening with other active sound or meditation conditions and neither found differences between active conditions (Mercadíe et al., 2015; Sorensen et al., 2019). These studies lacked a no-music control condition, making it difficult to form robust conclusions about the efficacy of intentional music listening in these studies. Similarly, a study of 169 young people with at least mild psychological distress using a music and emotion regulation mobile phone app showed no differences on emotion regulation, distress, or well-being between the music listening and the waitlist group at 1 month follow up (Hides et al., 2019).

Cognitive mechanisms measured in the intentional music listening studies included measures of attention and verbal memory among stroke patients, which were better amongst music listeners compared to those who listened to audiobooks or controls (Särkämö et al., 2008) (see **Supplementary Table 1**). Another study took behavioral observations of music recognition and ability to follow rhythm among people with dementia (Ihara et al., 2019). Evidence for physical activation was limited to two studies. One used behavioral observations of people with dementia (Ihara et al., 2019) and revealed that intentional music listening increased expressions of joy, eye contact, eye movement, engagement, talkativeness, and moving/dancing. Similarly, a study of participants with cardiac disease (Clark et al., 2016) reported that listening to music while walking made them feel more energized and the music tempo influenced them to walk faster or maintain an enhanced pace, motivated them to move and some found it helped them to walk for longer periods.

Sharing Music

1,478 abstracts were reviewed with only five studies about music sharing meeting the inclusion criteria for full review. Only one study did not use live music, instead utilizing scheduled Radio programs to initiate music sharing across people's homes (Travers and Bartlett, 2011). These studies tended to report outcomes on well-being, quality of life, pain and agitated behavior. The processes by which shared music listening appears to achieve these outcomes was through emotion, cognition (memory), physical activation (synchrony), social connection, and a sense of identity (see **Table 2**). The strongest results were for improved mood and/or emotions, which were found to improve for shared music listening across all studies. Improved social interaction and communication also appeared to show consistent effects, which were particularly marked among participants with dementia, though less so for those with more severe dementia (van der Vleuten et al., 2012; Clements-Cortés, 2017; Shibazaki and Marshall, 2017; Toccafondi et al., 2018). As part of this, sharing music stimulated participants' memories and facilitated reminiscing and storytelling that were shared with musicians, staff, and family members. In contrast, music sharing through community radio programming found no changes to loneliness among this shared listening group, likely indicating that less social interaction was facilitated (Travers and Bartlett, 2011). These results imply that there is something unique about sharing music when in the physical presence of others.

Synchronized movement and physical activation increased during live music sharing alongside the ability to remember, cognitively perceive, and anticipate auditory musical elements (Clements-Cortés, 2017; Shibazaki and Marshall, 2017). Participants were reported to be clapping, singing, and generally moving to the music. Shibazaki and Marshall (2017) noted that these physical responses were even evident for people with mobility issues and among those who had suffered strokes. Finally, for people with dementia, even when dementia was advanced, carers and researchers observed clear cognitive effects while sharing music, such as participants being able to predict, anticipate, and expect different musical patterns and changes (Shibazaki and Marshall, 2017).

Instrumental Music

From 1,701 abstracts screened, nine studies of instrumental learning and playing met selection criteria for full review. These focused on health and well-being outcomes from musical instrument playing, such as cognitive health in older adults, health behaviors, social determinants of health (housing stability and criminal behavior), and well-being. Instrument playing was associated with these outcomes *via* its effects on cognitive, mood, and/or social processes (see **Supplementary Table 1** and **Table 2**). Collectively, the research found that playing an instrument resulted in several positive outcomes, including improved mental health and quality of life and well-being (Perkins and Williamon, 2014; Seinfeld et al., 2016). Music instrument learning also resulted in improved enthusiasm, happiness, relaxation, and tolerance of uncertainty among people with learning disabilities (Wilson and MacDonald, 2019). Being part of a band or music group improved perceptions of social support and actual participation in social activities, interpersonal communication, self-esteem, and self-confidence among long-term musicians (Knapp and Silva, 2019), new musicians (Perkins and Williamon, 2014) and people with learning difficulties (Wilson and MacDonald, 2019). This latter study found that people who were socially isolated were more difficult to engage in music groups, with participants reporting lower levels of confidence and self-esteem (Wilson and MacDonald, 2019). Self-efficacy scores among children learning a musical instrument were also higher among those learning compared to those not learning an instrument, with this effect higher for girls, compared to boys (Ritchie and Williamon, 2011). This self-efficacy was related to greater levels of well-being and higher pro-sociality, with self-efficacy heightened particularly for girls.

Physical activation was found to be related to self-efficacy among children, where self-efficacy for music learning was associated with less hyperactivity, emotional symptoms, and behavioral problems (Ritchie and Williamon, 2011). Among older adults with higher SES, those learning to play a musical instrument reported a greater increase in the frequency of behaviors promoting physical activity and spiritual growth than older adults in the comparison condition (a U3A shared learning project) (Perkins and Williamon, 2014). Cognitive mechanisms were measured across several studies and found that for older adults, playing instruments was related to improvements in cognitive processing speed and attention, verbal fluency, executive function, visual scanning, and motor ability (Bugos et al., 2007; Bugos and Kochar, 2017), as well as letter fluency, learning, and short-term memory (Mansens et al., 2018). One study used fMRI in people with mild traumatic brain injuries following 8 weeks of piano lessons and found that there was a change to activation of the medial orbitofrontal cortex (OFC) (Vik et al., 2018). The OFC network regulates higher order cognitive processing, such as executive functions, including attention, decision-making, impulse control, and social behavior.

Group Singing

A total of 1,455 abstracts were identified in the initial search from which 14 studies met selection criteria for the full review, including six qualitative and eight quantitative studies (see **Table 1**). Prominent outcomes included mental health and well-being, cognitive health, and lung health. Group singing appeared to produce these health and well-being effects through the social, emotional and physical processes. Choral rehearsals have been found to increase feelings of social inclusion and connection over the duration of a singing rehearsal (see **Supplementary Table 1**). Studies involving both small and large group choirs of up to 232 members found that singing fosters social closeness, even in large contexts where individuals are not known to each other (Weinstein et al., 2016). Even after a single session of singing, a large group of unfamiliar individuals can become bonded to the same level as those who are familiar to each other within that group. These social inclusion effects are particularly important for various marginalized groups. For instance, 50 minority African Canadian women living in Nova Scotia identified choir singing and listening to spiritual music as spiritual activities that helped protect against the psychological effects of racism (Beagan and Etowa, 2011). The women described how singing supported their physical and mental health through a spiritual connection with the Lord and through their cultural connection with the African Christian community. In another study, women from nine different nationalities living in the UK who experienced postnatal depression participated in a 10-week singing group and reported that the sessions provided an authentic, social and multicultural creative experience (Perkins et al., 2018). Two Australian studies involving adults who were marginalized due to chronic mental and physical health problems described how choir singing helped them to develop social connections within the choir (Williams et al., 2019) and later with audiences (Dingle et al., 2013). Furthermore, a reduction in loneliness and an increased interest in life was reported by an ethnically and racially diverse group of seniors participating in a Community of Voices choir in San Francisco (Johnson et al., 2020).

Cognitive, social, and mood effects of group singing are prominent in older adult studies (Lamont et al., 2018). For example, in retirement village residents in Australia, those who attended an 8-session group music program called Live Wires showed significantly improved cognitive performance and identification with the retirement village compared with the control group (Dingle et al., 2020). Similarly, in the Singing for the Brain project in the UK, interviews with 20 people with dementia and their care givers indicated that important mechanisms were cognitive (accepting the diagnosis, positive

impact on memory), social (a shared experience, feeling included and supported), and improved mood (Osman et al., 2016). Similarly a study in Finland assessed people with dementia and their caregivers before and after a 10-week program of either singing or music listening together, designed to coach the caregivers to incorporate music and singing into their dementia care (Särkämö et al., 2014). Music listening temporarily improved overall cognition, attention and executive function, and a longer-term improvement in orientation, while singing enhanced short-term and working memory. Music listening had a long-term positive effect on Quality of Life for both the patients and caregivers.

In terms of physical mechanisms, participants of the Sing for Lung Health choir described improvements in breathing, sputum clearance and exercise tolerance, as well as a general sense of improved well-being. Again, social connections and a shared purpose were key mechanisms, as well as physical activation (McNaughton et al., 2017). This 12-week program featured deep breathing, vocalization exercises and singing rounds of familiar songs.

A sense of achievement and a new identity as a member of a choir were mechanisms revealed in several studies (Dingle et al., 2013; Perkins et al., 2018; Williams et al., 2020), particularly during performances (McNaughton et al., 2017). Singing, however, is not necessarily better than other arts-based group activities in terms of health and well-being effects. A study 135 adults involved in seven different adult education classes in singing, creative writing and crafts found that mental and physical health, and satisfaction with life, improved in all groups (Pearce et al., 2016). In the study with marginalized adults, mental well-being improved for members of both a choir and a creative writing group as long as participants formed a sense of identity with their group (Williams et al., 2019).

Music, Movement, and Dance

This search retrieved 743 articles of which four studies met criteria for full review. The health outcomes measured differed widely across the four studies. These included improved measures of cognitive health in the participants with mild cognitive impairment (Doi et al., 2017); healthy weight measures (BMI and % body fat) of African American women (Murrock and Gary, 2010); improved cognitive health among stroke survivors (Jeong and Kim, 2007); and mental health of new mothers (Vlismas et al., 2013).

While social connection was acknowledged as an important process across most of these studies, only two measured types of social connection. Interventions were found to improve the quality of interpersonal relationships for stroke survivors compared to people who did not participate in movement interventions (Jeong and Kim, 2007), and to improve interactions between mothers and their infants (Vlismas et al., 2013). Specifically, mothers felt that they enjoyed interactions with their infants more and reported increases in dyadic reciprocity between them. Similarly, physical activation, while acknowledged as a driving mechanism, was only measured in two studies. For African American women, participating in a dance group meant that they were more physically active than those not participating in dance (Murrock and Gary, 2010). However, for adults with mild cognitive impairment, there was no difference in physical activity levels whether they were part of the dance group, playing instruments, or in a health education group. For one study, cultural identity was made salient for the participants, where African American women reported that the dance intervention and choreography incorporated the importance of their church, spirituality, values, and beliefs and provided a positive space for them to talk about their health concerns (Murrock and Gary, 2010).

Lyrics and Rapping

From 1978 abstracts reviewed, four articles focusing on rapping or other lyric-focused music activities met our inclusion criteria. The outcomes from these included mental health, well-being, and cognitive health. The effects of lyrics and rapping appeared to act on emotional and social processes, self-esteem and identity (see **Supplementary Table 1** and **Table 2**). For instance, for children and adolescents, sung or spoken lyrics (including rap), resulted in improvements to measures of emotional well-being on the Strength and Difficulties Questionnaire (Uhlig et al., 2019) and teacher-rated emotional symptoms, empowerment, and fewer depressive symptoms (Travis and Bowman, 2012). Further, those least likely to report depressive symptoms were those who felt rap music inspired them to better connect with others, consider the experiences of others, and want to make a difference in their communities. Young people listening to rap and hip-hop showed that their sense of cultural identity was associated with music-based empowerment (Travis and Bowman, 2012), and physically engaging in rap and song among children influenced their levels of physical activation (Uhlig et al., 2019). This included reductions in hyperactivity and inattention, and improved goal-directed behavior (Uhlig et al., 2016). Sleep time also showed changes among this group those in the rap and sing group slept significantly more than children who did not participate in this program.

A study in university students found that exposure to lyrics related to suicide were associated with remembering more nihilistic lyrics than were present in the song (Peterson et al., 2008). However, after exposure to this music, many participants responded with stories that exhibited altruistic themes. Higher endorsement of lyrical messages around risk (e.g., violence, substance use, and derogatory treatment of women) was related to high self-esteem among young males (Travis and Bowman, 2012). For people with Alzheimer's disease and healthy older adults, memory was positively affected when they were exposed to lyrics that were spoken or sung (Simmons-Stern et al., 2012). For these older adults, both types of exposure to lyrics resulted in equal memory of a songs content.

Song Writing, Composition, and Improvisation

This search retrieved 1,280 articles, of which only three studies met the inclusion criteria for the review. Music composition was found to be an important tool for supporting healthy aging and well-being of older adults learning to compose music collaboratively with a string quartet and a professional

composer. For these participants, composition also created more opportunities for creativity and feelings of control and self-efficacy (Habron et al., 2013) (see **Supplementary Table 1**). In the study by Bartleet et al. (2016), jamming and music making between Aboriginal and non-Indigenous musicians provided opportunities to develop deep, transformative, intercultural engagement and connection. For these groups, music making was a way to cross boundaries using music as a shared language and to understand and share in diverse experiences. Music students found that the simple act of jamming helped to build a strong rapport, sense of mutual respect, and life-long friendships. Identity making and relationships were very clear among the group-based song writing and composition studies. For example, older adults felt composition led to self and social identity making, and meaningful social engagement with other participants and musicians with some relationships enduring after the program ended (Habron et al., 2013).

In Fallon and colleagues' experimental study (2020), 105 university students were asked to complete a stressful task and were then randomly assigned to one of three recovery conditions: control, music listening, or music improvisation using a xylophone. The physiological measure (electrodermal activity) showed greater stress reduction during recovery for those in the music listening condition compared to the improvisation and control groups (Fallon et al., 2020). The improvisation group showed a significant improvement in self-reported levels of calmness, irritation (decrease), and satisfaction during the recovery phase.

DISCUSSION

This scoping review of 63 studies revealed that all eight categories of music activities demonstrated some benefits to health or well-being, although it is difficult to make generalized statements due to the diversity of study designs and measures across studies. An abundance of studies of music listening, group singing, and instrument playing met criteria for inclusion, but relatively few focused on music sharing, dance or movement to music, lyrics or rapping, or songwriting, improvisation and composition. As the descriptions in **Table 1** indicate, some music activities featured in more than one category (e.g., music listening was involved to some extent in all eight types of activity, apart from some kinds of lyrics/rapping), while other activities were found in only one or two categories (e.g., movements *to* music were a key part of the movement and dance category, while movements *to create* music were characteristic of the instrument playing, group singing, and songwriting, composition, and improvisation category). The eight activities also represent a spectrum of engagement with the selection and creation of music, from very low levels in the case of receptive music listening through to very high levels in the case of songwriting, composition, and improvisation. The purpose of the music activity and the measures assessed in each study reflected this spectrum of engagement. By considering this full spectrum of music activities, the current review extends on previous reviews that had a narrower focus such as music listening (Finn and Fancourt, 2018), group singing (Williams et al., 2018), or instrument playing and dance (Sheppard and Broughton, 2020). It also highlights the need for future research in the field of music, health and well-being to clearly articulate the type of music activity under investigation (Kreutz, 2015).

In regard to the mechanisms by which these music activities produce effects on health or well-being, **Table 2** summarizes the evidence drawn from the 63 papers reviewed. Receptive music listening tended to be used in health or medical spaces for the purpose of decreasing perceptions of pain and anxiety and for acute post-operative recovery, or in aged care settings for increased activation and improved mood among older adults with dementia. Many of these studies showed that *decreased physiological arousal* was a key mechanism by which music listening was related to effects on pain and anxiety. The most consistent results were lowered blood pressure, increase in oxytocin, and decrease in cortisol during music listening. Interestingly, music listening was associated with *increased arousal, activation*, and social interaction in the studies of people with dementia and their carers (Götell et al., 2002; Gotell et al., 2009). Of the 13 studies in this category, four measured pain outcomes, and three of these reported lower pain in the music condition (Calcaterra et al., 2014; Téllez et al., 2016; Çetinkaya et al., 2018) while one study did not find any effect of music listening on pain (Chantawong and Charoenkwan, 2017). It is possible that in this study, the researchers' selection of Western or New Age instrumental music did not align with the Thai women's personal preferences during the cervical excision procedure. These findings align with an earlier review showing how music listening can enhance medical treatments and can be used as an adjunct to other pain-management programs (Bernatzky et al., 2011). This review concluded that musical pieces chosen by the patient are typically more effective for pain management than music chosen by a staff member. Interestingly, a recent study found that the music people chose to manage pain was commonly high energy, danceable music with lyrics (Howlin and Rooney, 2020) so it should not be assumed that people select soft, slow tempo, instrumental music when in pain.

Positive effects on *mood or emotion regulation* were reported in studies across all music activity categories (**Supplementary Table 1**). In the music listening categories, reductions in anxiety were commonly reported. These positive effects on anxiety and pain were not confined to music listening since comparison conditions also produced benefits. For example, a comparison hypnosis condition was associated with decreased anxiety and increased optimism in women undergoing breast tissue biopsy in a hospital clinic (Téllez et al., 2016) while silent relaxation was as effective as music listening for lowering cortisol and pain in knee replacement surgery patients (Finlay et al., 2016). Similarly, the 14 studies on intentional music listening commonly focused on the role of music in reducing distress, particularly in preparation for, during, or recovery from, significant health events. These studies revealed that actively listening to music showed effects on *cognition, emotion, physical activation, and physiological arousal*. These findings are consistent with an established body of research on music listening and affective responses on the two dimensions of arousal and valence (e.g., Juslin et al., 2010; Eerola and Vuoskoski, 2013). The mood enhancing effects of group music activities such as singing, dancing and instrument playing is consistent with the findings of a systematic review of the effects of

social group programs (music groups and others) on depression (Dingle et al., 2021) and an earlier longitudinal study of 5,055 UK older adults showing that more group memberships measured in the first wave was associated with a decreased likelihood of depression up to 4 years later (Cruwys et al., 2013).

Enhanced *social bonding and connection* was found in studies across many of the music activity categories. For example, shared music listening in the form of live music concerts enhanced social connections and mood in older adults and in hospital patients, yet was featured in few studies, which suggests this is an underutilized approach within aged care and hospital services. Group singing was associated with health and well-being of older adults and those with mental health problems, lung disease, stroke, and dementia through its effects on cognitive functions, mood, social connections, and identity. Both music listening and carer singing decreased agitation and improved posture, movement, and well-being of people with dementia. These findings indicate that singing is not only beneficial for the identified patients but also for their caregivers and loved ones (Forbes, 2020). *Social and cultural identity* was another mechanism highlighted in relation to some music activities. The finding that identification with a music group is associated with the satisfaction of various psychological needs has been noted in several recent studies (Williams et al., 2019; Kyprianides and Easterbrook, 2020; Draper and Dingle, 2021). Singing, dancing, and hip-hop can help ethnic minority group members to connect with their culture (Murrock and Gary, 2010; Beagan and Etowa, 2011; Travis and Bowman, 2012).

Cognitive mechanisms such as improved memory or attention were noted in several music activity categories. For instance, group singing was associated with improved cognitive health in older adults and those with dementia. Learning to play a musical instrument was associated with cognitive performance, self-esteem, and well-being in diverse populations including school students, older adults, and people with mild brain injuries. Dance and movement with music programs were associated with improved health and well-being in people with dementia, women with postnatal depression, and sedentary women with obesity through various cognitive, physical, and social processes. Clinicians and care workers planning to introduce a musical activity to enhance the cognitive health of their participants should consider the level of musical training and capability of new learners. It may be necessary to develop innovative ways for participants to engage with music that do not require an ability to read sheet music or to have a high level of fine motor skill. Group singing can be conducted using lyric sheets and a call-and-response style for learning the various vocal parts, as has been used successfully with marginalized adults (Dingle et al., 2013; Williams et al., 2019). Furthermore, innovative work is in progress adapting musical instruments so that they are simpler for older adults to create music with (MacRitchie and Milne, 2017).

Finally, *self-esteem, empowerment, and sense of achievement* were mechanisms by which rapping, choir singing, musical instrument playing, and composition, songwriting and improvisation produced positive effects on the health and well-being of participants. Rapping, songwriting and composition helped marginalized people to find their voice and increased social inclusion, intercultural connections, and empowerment.

CONCLUSION

Although the field of music, health and well-being requires further development, there is emerging evidence that specific music activities may be recommended for specific psychosocial purposes and for specific health conditions. Music activities offer a rich and underutilized resource for health and well-being to participants of diverse ages, backgrounds, and settings.

AUTHOR CONTRIBUTIONS

GD designed the scoping review and led the write up. LS generated the search terms, conducted the library searches, assisted with the tabulation of results, and the write up. All authors contributed to the screening, reviewing, and summarizing of papers in their sections and contributed to the final manuscript.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.713818/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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frontiers in Psychology

ORIGINAL RESEARCH
published: 21 October 2021
doi: 10.3389/fpsyg.2021.744443

A Novel Mindful-Compassion Art-Based Therapy for Reducing Burnout and Promoting Resilience Among Healthcare Workers: Findings From a Waitlist Randomized Control Trial

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OPEN ACCESS

Edited by:
Michael Koon Boon Tan, Sheffield Hallam University, United Kingdom

Reviewed by:
Mark Durkin, Robert Gordon University, United Kingdom
Valerie HUET, The British Association of Art Therapists, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *20 July 2021*
Accepted: *08 September 2021*
Published: *21 October 2021*

Citation:
Ho AHY, Tan-Ho G, Ngo TA, Ong G, Chong PH, Dignadice D and Potash J (2021) A Novel Mindful-Compassion Art-Based Therapy for Reducing Burnout and Promoting Resilience Among Healthcare Workers: Findings From a Waitlist Randomized Control Trial. Front. Psychol. 12:744443. doi: 10.3389/fpsyg.2021.744443

Protecting the mental health of healthcare workers is an urgent global public health priority. Healthcare workers, especially those immersed in palliative care, are prone to burnout due to the intense emotions associated with end-of-life caregiving. This study examines the efficacy of a novel, multimodal, and group-based Mindful-Compassion Art-based Therapy (MCAT) that integrates reflective self-awareness with creative emotional expression for protecting healthcare workers' mental health. A dual-arm open-label waitlist randomized controlled trial was conducted. A total of 56 healthcare workers were recruited from the largest homecare hospice in Singapore and randomized to the immediate-treatment condition of a standardized 6-week, 18-hours MCAT intervention ($n = 29$), or the waitlist-control condition ($n = 27$). Self-administered outcome measures on burnout, resilience, emotional regulation, self-compassion, death attitudes, and quality of life were collected at baseline, post-intervention/second-baseline at 6 weeks, and follow-up/post-intervention at 12 weeks. Results from mixed model ANOVAs reveal that treatment group participants experienced significant reduction in mental exhaustion, as well as significant improvements in overall emotional regulation, nonreactivity to intrusive thoughts, approach acceptance of death, and afterlife belief as compared to waitlist-control immediately after MCAT completion. Effect sizes of these impacts ranged from medium to large ($\eta^2 = 0.65$ to 0.170). Results from one-way ANOVAs further reveal that the treatment gains of reduced mental exhaustion and increased emotional regulation were maintained among treatment group participants at 12-weeks follow-up compared to baseline, with new benefits identified. These include increased ability to observe and describe one's experiences, elevated overall self-compassion, greater mindful awareness, enhanced common humanity, and better quality of life. Effect sizes of these impacts were large ($\eta^2 = 0.128$ to 0.298). These findings reflect the robust effectiveness and positive residual effects of MCAT for reducing burnout,

building resilience, nurturing compassion, fostering collegial support, and promoting mental wellness among healthcare workers. The clinical model and applicability of MCAT in larger and more diverse caregiving contexts, such as family dementia care, are discussed.

Clinical Trial Registration: ClinicalTrials.gov # NCT03440606, #NCT04548089.

Keywords: burnout, resilience, mindful compassion, art-based therapy, multimodal intervention, palliative end-of-life care, randomized control trial

INTRODUCTION

Healthcare workers, especially those immersed in palliative care, engage with life and death situations and dilemmas on a day-to-day basis and are exposed to the immense stress of end-of-life caregiving. Amidst these challenges, they are expected to provide unwavering compassionate care to dying patients and their families with immediate responsiveness (Vachon, 1995). However, they receive minimal support for the mental, emotional, and spiritual strains that result from the intense nature of their work, as they often suffer in silence from the vicarious trauma of witnessing the sufferings and deaths of their patients. Repeated studies have found that burnout is a common phenomenon found among healthcare workers caring for dying patients, as recurrent encounters with grief and loss, coupled with a lack of self-care and mounting work-related stress are all conduits to poor mental health (Koh et al., 2015, 2020; Ho, 2021). The negative effects of unresolved work-related stress can trickle down to patients and the rest of the healthcare team, threatening the quality, safety, and integrity of patient care. Despite the many detrimental impacts of burnout, there is a scarcity of holistic and empirically tested interventions to support the mental health of healthcare workers (Mateen and Dorji, 2009). There is clearly an urgent need to develop an effective mental health self-care program for professional careers, as protecting their mental health is an urgent global public health priority (World Health Organization, 2016).

Burnout is a reaction to chronic job-related stress and occurs when individuals become overwhelmed with the mental, emotional, and physical distress associated with their professional work. Defined as "a state of exhaustion in which one is cynical about the value of one's occupation and doubtful of one's capacity to perform" (Maslach et al., 1996), burnout can translate into a "literal collapse of the human spirit" (Storlie, 1979), leading to various mental health morbidities including depression, anxiety, and hopelessness (Huang et al., 2009). Such effects inevitably result in loss of clinical hours that amount to major financial losses in healthcare systems (Dill and Cagle, 2010), an example being an estimated US$4.6 billion annual loss in the US healthcare due to such causes (Han et al., 2019). The impact of burnout extends to physical health, correlating with somatic complaints, weakening of the immune system, diabetes, coronary heart disease, cardiovascular diseases, and musculoskeletal pain (Melamed et al., 2006; Salvagioni et al., 2017). Burnout has also been found to cause apathy and hopelessness among healthcare workers, negatively affecting their self-esteem, expression of empathy, and safety of care (Dewa et al., 2017; Wilkinson et al., 2017). Most alarmingly, burnout has consistently been identified as the leading cause of major medical errors among surgeons and physicians in active practice (Shanafelt et al., 2010; Tawfik et al., 2018). Repeated studies have found that healthcare workers around the world are experiencing alarmingly high levels of burnout, ranging from 47 to 70% in the US (Campbell et al., 2010; Ripp et al., 2011), and 71.8 to 80.7% in Singapore (See et al., 2016; Lee et al., 2018). Dill and Cagle (2010) further reported that due to stress and burnout, turnover rate of in-patient hospice workers stands at a worrying 30% and reaches as high as 60% for homecare workers, posing great disruptions to care continuity as well as threats to care quality. These figures may very well worsen with population aging and the relative increase in the demand for palliative care in all advanced societies.

End-of-life caregiving, by its very nature, necessitates strong levels of psycho-socio-emotional competence. Adequately supporting healthcare workers to better cope with caregiving stress requires interventions that promote self-care behaviors for enhancing one's sense of autonomy, emotional regulation, and empathic capacity (Rushton et al., 2013). Such interventions would need to provide avenues to cultivate resilience *via* meaning-making to derive a renewed appreciation and purpose of one's caregiving roles (Ablett and Jones, 2007). Of particular, importance is establishing a communal platform for healthcare workers to periodically reflect on their own attitudes, feelings, and anxieties related to loss and grief, while being able to express and share their thoughts with their peers to build mutual respect, compassionate understanding, and collegial support (Chan and Tin, 2012). Emotion-focused and meaning-focused coping strategies that incorporate creativity and expressive arts have proven to best help achieve these intervention goals for empowering healthcare workers (Nainis, 2005).

Over the past two decades, a burgeoning of the literature on mindfulness practice and art-based therapy has revealed their beneficial effects on mental health promotion and stress reduction. Mindfulness practice enables individuals to tune into their immediate experience and emotionality with openness, curiosity, and acceptance (Bishop et al., 2008), thus fostering a deepened understanding of self with greater emotional regulation, together with the potential for developing self-kindness and self-compassion toward painful experiences (Neff, 2003). A 2014 systematic review and meta-analysis of high-quality randomized controlled trials (RCT) found that mindfulness-based interventions provide both short-term and long-term benefits to individuals' physical and psychological health, including the reduction of stress, anxiety, depressive symptoms, and improvement in chronic disease management (Victorson et al., 2015). Art therapy provides individuals with the means to reframe and communicate experiences and feelings that are difficult to comprehend and verbalize,

enabling deep reflections, and creative self-expressions that transcend the barriers of language (McNiff, 2007), thereby empowering one's sense of self-mastery, interconnectivity, and capacity for healing (Potash et al., 2018). A 2016 systematic review found that art-based therapy is effective in the treatment and aids the recovery of people suffering from depression, post-traumatic stress disorder, and other mental illnesses (Van Lith, 2016). Health and mental health professionals can obtained training and support from qualified art therapists to ethically integrate art making into their clinical practices as a therapeutic tool (Kalmanowitz and Potash, 2009).

The integration of mindfulness practices and art-based therapy for addressing the self-care needs of palliative care professionals is a scarcely explored area (Rappaport, 2013). Building on the clinical foundation of art therapy-based supervision (Potash et al., 2014, 2015) for palliative care workers, while augmenting it with a carefully curated program of mindful-compassion practices (Gilbert and Choden, 2014), together with didactic learning processes that accentuate self-care knowledge through psychoeducation (Brown, 2018), a novel Mindful-Compassion Art-based Therapy (MCAT) for mental health self-care was developed. MCAT is a highly structured, multimodal, and group-based intervention that aims at creating a supportive platform for healthcare workers to deeply reflect, explore, and creatively express their insights and experiences of stress and self-care, caregiving competences and caregiving challenges, loss and grief in facing patients' death, and aspirations and meaning of caregiving. These interactive processes serve to foster self-understanding, interconnectedness, internal strength, and self-compassion. The ultimate goal of MCAT is to alleviate burnout, cultivate resilience, and promote mental wellness among healthcare workers caring for dying patients. This article reports the clinical efficacy of MCAT. As a pilot study, no *a priori* hypotheses were developed.

MATERIALS AND METHODS

This intervention study adopted a dual-arm open-label waitlist RCT design comprising two groups: an immediate-treatment group and a waitlist-control group. The trial was registered on February 22nd, 2018. Healthcare workers were recruited for the study. Pre-, post-, and follow-up data were collected and analyzed to evaluate intervention effectiveness in achieving the stated objectives. Ethical approval was received from the Nanyang Technological University's Institutional Review Board (IRB-2015-04-021) prior to the commencement of the study.

Sampling

Study participants comprised 56 frontline healthcare workers recruited from HCA Hospice Care, the largest home hospice care provider in Singapore ($N=56$). Sample size was calculated based an 80% power to detect an effect size (Cohen's d) of 0.8 (Lambert and Ogles 2004) between the treatment group and the control group at 5% level of significance (two-tailed test); the minimum sample required is 52, or 26 in each group. Inclusion criteria included healthcare workers (i.e., physicians, nurse, medical social workers, and allied health professionals) whose primary job was caring for terminally ill patients, 21 years old and above, and fluent in both written and spoken English. Exclusion criteria included the inability to provide informed consent or major depression (or other mental health conditions) or both.

Intervention Design

Mindful-Compassion Art-based Therapy comprised 6 week, 18 hours, standardized, and group-based intervention that integrates the reflective power of mindfulness meditation with the expressive power of art-based therapy to support and enhance the psycho-socio-emotional health of healthcare workers. MCAT was collaboratively delivered by two MCAT therapists including one accredited art therapist and one clinical researcher trained in mindfulness-based stress reduction. Each MCAT group was heterogeneous and included 9–10 physicians, nurses, social workers, allied health professionals, personal care workers, and hospice program staffs. Each MCAT session covered a unique topic that aims to promote understanding, acceptance, and compassion for self and others to cultivate psychological resilience and shared meaning. The topics are strategically designed to build upon each other week by week with a scaffolding framework that deepens the exploration of self-awareness, the practice of self-care, and the promotion of communal support though a series of connected themes Starting with Week 1 – Overview of and Empowering Self-Care; followed by Week 2 – Understanding and Transforming Stress; Week 3 – Inspirational Caregiving; Week 4 – Challenging Caregiving; Week 5 – Understanding Loss and the Impact of Grief; and concluding with Week 6 – Renewing Aspirations and Meaning Reconstruction. Each weekly session began with a check-in session to provide opportunities for participants to discuss questions relevant to the materials covered in previous weeks while allowing MCAT therapists to make a connective transition between weekly topics and themes (5 min); this is followed by a mini psychoeducation module comprising of an interactive lecture support by visual aids that introduces the foundational theory and empirical research that accentuate the selected topic (10 min); a mindfulness meditation with a theme-based guided imagery exercise (25 min); a facilitated expressive art-making session that center on the selected theme (45 min); a short break (10 min); a creative and reflective writing activity (35 min); small group and large group sharing (40 min); and ending with a mindful breathing check-out (5 min). The integration of these therapeutic elements aimed to provide participants with the foundational knowledge on various aspect of self-care, deepen cognitive awareness, and understanding of their emotionality, while empowering them to be fully aware and articulate of the immediacy of their experiences, and to appreciate the authenticity of their self-reflections, creative expressions, personal insights, and collective wisdoms generated through individual and group work. A detailed intervention protocol is published elsewhere (Ho et al., 2019), and **Table 1** outlines the MCAT intervention components.

Research Procedures

Potential participants were referred to the research team by the medical director of collaborating site, with the understanding

TABLE 1 | Mindful-Compassion Art-based Therapy intervention framework.

Session	Weekly topics & psychoeducation	Mindfulness meditation	Visualization theme	Art making, creative, and reflective writing activities
Week 1	Overview of & Empowering Self-Care	Affectionate Breathing	Self-Kindness	Mandala of Self-Care/Reflective Art Observation
Week 2	Understanding & Transforming Stress	Compassionate Body Scan	Bodily Stress	Symbol of Stress/Transformative Art and Reflective writing
Week 3	Inspirational Caregiving	Loving Kindness Meditation	Strengths in Patient Care	Symbol of Strength/Arts Observation and Creative Response Writing
Week 4	Challenging Caregiving	Loving Kindness Meditation	Challenges in Patient Care	Symbol of Limitation/Art Observation & Creative Response Art Writing
Week 5	Understanding Loss & the Impact of Grief	Meditation on Impermanence	A Patient's Death	Symbol of Grief/Collective Small Group Mural & Reflective writing
Week 6	Renewing Aspirations & Meaning Reconstruction	Meditation on Giving & Receiving Compassion	Wisdom Learnt & Meaning of Work	Mandala of Meaning/Collective Large Group Mural & Reflective writing

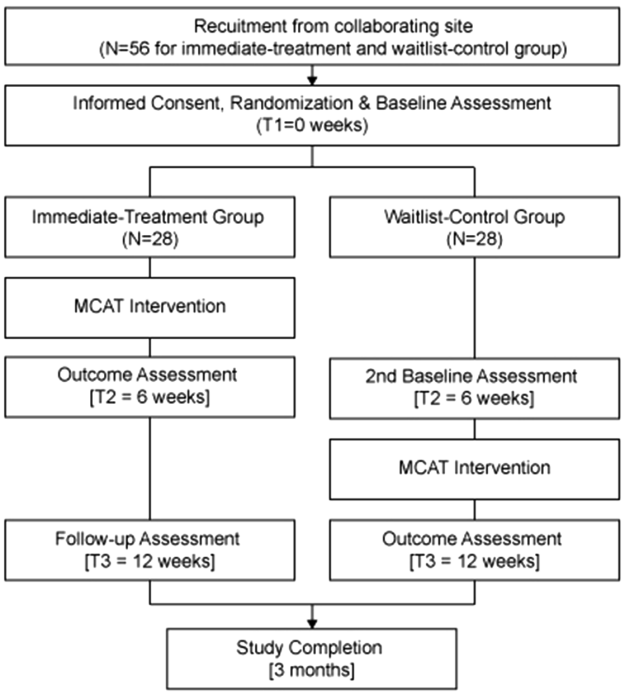

FIGURE 1 | Study Flow Diagram.

that they would be given allocated time during regular working hours to participate in the MCAT intervention without any financial implications. Potential participants were also assured that refusal to participate is respected and would not result in any negative consequences. Recruitment was conducted through 3 sequentially overlapping rounds, and each recruitment round comprised 18–20 participants. Upon completion of informed consent and baseline assessments, participants were randomized in either the immediate-treatment group or the waitlist-control group. Simple randomization for each recruitment round was conducted by using an allocation sequence based on a computer-generated list of random numbers. Specifically, a random number sequence ranging from 1 to 18 or 20 (depending on the number of participants recruited in each recruitment round) was generated *via* Research Randomizer (Urbaniak and Plous, 2019). Thereafter, each participant was randomly assigned a unique number from the sequence. Participants whose numbers occupy the first nine to 10 slots in the sequence were assigned to the immediate-treatment group, whereas participants whose numbers occupy the last nine or 10 slots were assigned to the waitlist-control group. Self-administered quantitative assessments were conducted for both groups at baseline (T1), thereafter the immediate-treatment group underwent the 6-week MCAT intervention. Participants in the waitlist-control group did not receive any intervention for the first 6 weeks. Upon completion of MCAT among the immediate-treatment group, both groups were assessed again (T2). Subsequently, the waitlist-control group received the same 6-week MCAT intervention. At the end of all intervention components, a final exit assessment was conducted on both groups (T3). A flow diagram of recruitment and study conduct is provided in **Figure 1**.

Outcome Measures

Outcomes were assessed with quantitative and qualitative measures. All study participants were assessed by a battery of standardized self-reported psychometric measures on burnout, resilience, emotional regulation, and quality of life at baseline (T1), immediately post-intervention/second-baseline at 6 weeks (T2) and follow-up assessment/immediately post-intervention at 12 weeks (T3). In addition to the quantitative assessment, large group sharing during from all MCAT sessions were recorded with participants' consent and transcribed verbatim for analysis.

Quantitative Measures

Demographic information including age, gender, marital status, religion, professional roles, employment status, and years of professional experience in end-of-life care was collected at baseline. Primary outcomes included burnout and resilience. Burnout was assessed by the 16-items Maslach Burnout Inventory – General Survey (MBI-GS; Maslach et al., 1996), with higher scores representing greater work-related stress (Baseline Cronbach $\alpha = 0.81$). The MBI-GC assesses three

domains of burnout, including exhaustion, cynicism, and professional efficacy; scoring for professional efficacy is reversed, with lower scores representing greater burnout. Resilience was assessed by the 11-item Ego-Resilience Revised Scale (ER-11; Farkas and Orosz, 2015), with higher scores corresponding to greater trait resilience (Baseline Cronbach's $\alpha = 0.78$). The ER-11 assesses three domains of resilience, including active engagement with the world, problem-solving strategies, and integrated performance under stress. The MBI-GS and ER-11 possess internal validity, reliability, and cross-cultural applicability.

Secondary outcomes included self-reported levels of emotional regulation, self-compassion, death attitude, and quality of life. Emotional regulation was assessed by the 39-items Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008), with higher scores representing higher level of emotional regulation (Baseline Cronbach $\alpha = 0.89$). The FFMQ assesses five domains of emotional regulation, including the ability to observe, and describes one's experience, act with awareness, non-judgment of experience, and nonreactivity to intrusive thoughts. Self-compassion was assessed by the 12-items Self-Compassion Scale (SCS) Short Form (Raes et al., 2011), with higher scores representing higher self-compassion (Baseline Cronbach $\alpha = 0.84$). The SCS assesses six domains of self-compassion, including self-kindness, mindfulness, common humanity, self-judgment, isolation, and over-identification; scoring for self-judgment, isolation, and over-identification are reversed, with lower score indicating higher self-compassion. Death attitude was assessed by the 32-items Death Attitude Profile-Revised (DAP-R; Wong et al., 1994), which measures seven unique domains of death attitudes, with higher scores representing higher levels of fear of death (Baseline Cronbach $\alpha = 0.85$), death avoidance (Baseline Cronbach $\alpha = 0.90$), approach acceptance (Baseline Cronbach $\alpha = 0.81$), escape acceptance (Baseline Cronbach $\alpha = 0.91$), neutral acceptance (Baseline Cronbach $\alpha = 0.82$), personal acceptance (Baseline Cronbach $\alpha = 0.62$), and afterlife belief (Baseline Cronbach $\alpha = 0.88$; Ho et al., 2010). Finally, quality of life was measured by the 8-item EUROHIS Quality of Life Scale-8 (EUROHIS-QoL-8; da Rocha et al., 2012), with higher scores representing greater quality of life (Baseline Cronbach's $\alpha = 0.84$). Again, the FFMQ, SCS, DAP-R, and EUROHIS-QoL-8 possess internal validity, reliability, and cross-cultural applicability.

Qualitative Measures

Weekly group sharing was audio recorded and transcribed verbatim. In addition, all artworks together with creative and reflective writings created by study participants were documented and categorized as supplementary data. To protect the confidentiality of the participants, identifying information was removed and pseudonames were assigned to each participant before analysis.

Data Analyses

Quantitative data were entered, stored, and analyzed using SPSS statistical analysis software. Baseline demographic characteristics between intervention and waitlist-control groups are presented either number (%) for categorical variables or mean (SD: standard deviation) for quantitative variables. The immediate-treatment group and waitlist-control group were compared on the primary outcomes and secondary outcomes. To examine the changes in continuous outcome variables between group and over, mixed model ANOVAs were conducted for each outcome with the appropriate means, F ratio, *value of p*, and the effect size estimates of Eta-Squared (η^2) reported. *Post-hoc* tests using the Bonferroni correction were also conducted to control for error. Moreover, one-way ANOVAs were performed for the immediate-treatment group with an additional time point. All analysis was adjusted for baseline demographic variables (age, gender, marital status, education, religion, employment status, professional roles, and years of professional experience). All *p*-values were based on two-tailed tests of significance and those less than 0.05 were considered statistically significant. Qualitative data were managed by the QSR NVIVO software package. Weekly group sharing was audio recorded, transcribed verbatim, and verified by research team members, as well as all participants' creative and reflective writings. All qualitative data were analysis using thematic analysis which involved several steps of data reduction and data reconstruction (Braun and Clarke, 2006). First, authors 1 and 2 conducted multiple reading of the transcripts and narrative writings to familiarized themselves with the data. Author 1 and 2 then conducted line-by-line coding to develop descriptive themes and analytical categories that represented a patterned response or meaning within the data which captured something important in relation to the research question (Pope et al., 2000). This was followed by regular meetings among all authors for the further refinement of themes and categories to encapsulate the meaning and content within the cluster of similar codes, with the emergent themes and sub-themes created *via* a summary chart. All authors reviewed and defined the emergent themes; once consensus was reached, and operational definitions were created. To maximize credibility, criticality, and authenticity, strategies, such as theory triangulation, research triangulation, and member checking, were exercised throughout the analytical process.

RESULTS

Participant Demographics

A total of 56 participants were successfully recruited and completed the study with no attrition throughout the entire research period. Participants were aged between 23 to 64 years ($M = 44.40$, $SD = 10.97$), predominantly female (75%) and have completed a bachelor's degree or above (77%). The majority of participants was nurses (48%), followed by physicians (14%), medical social workers (14%), and allied care professionals (14%). The years of end-of-life care experience ranged from 1 to 30 years ($M = 5.08$, $SD = 5.80$), with the majority having 1 to 5 years of experience (70%). There were no statistically significant differences in demographic measures

between treatment group and control group. Please refer to **Table 2** for more information regarding participants' demographics.

Quantitative Findings

Results from mixed model ANOVAs reveal significant interaction effects between immediate-treatment group and waitlist-control group across time. Specially, treatment group participants experienced significant reduction in mental exhaustion [16.48 vs. 17.48; $F(2, 108) = 3.27$, $p = 0.042$, $\eta^2 = 0.065$] immediately upon MCAT completion as compared to waitlist control. Treatment group participants also experienced significant improvements in overall emotional regulation [16.89 vs. 16.37; $F(1.7, 91.8) = 5.34$, $p = 0.006$. $\eta^2 = 0.170$], nonreactivity to intrusive thoughts [3.46 vs. 3.29; $F(1.7, 91.8) = 5.32$, $p = 0.009$, $\eta^2 = 0.090$], approach acceptance of death [42.03 vs. 39.07; $F(1.7, 93.7) = 4.22$, $p = 0.022$, $\eta^2 = 0.072$], and afterlife belief [11.21 vs. 9.78; $F(2, 108) = 3.97$, $p = 0.022$, $\eta^2 = 0.068$] immediately after intervention as compared to waitlist control. Effect sizes of these changes were medium to large. These findings reflect MCAT's robust efficacy for burnout reduction and wellness promotion among healthcare workers. Details of mixed model ANOVAs are provided in **Table 3**.

Results from follow-up one-way ANOVAs reveal that the treatment gains of reduced mental exhaustion [16.76 vs. 20.97; $F(2, 56) = 13.72$, $p < 0.001$, $\eta^2 = 0.329$] and increased overall emotional regulation [16.98 vs. 15.85; $F(2, 56) = 12.65$, $p < 0.001$, $\eta^2 = 0.311$] were maintained among treatment group participants at 12-weeks follow-up compared to baseline, with new benefits identified. These include increased ability to observe [3.59 vs. 3.29; $F(2, 56) = 6.09$, $p = 0.004$; $\eta^2 = 0.179$] and describe [3.34 vs. 3.00; $F(2, 56) = 9.82$, $p < 0.001$, $\eta^2 = 0.260$] one's internal and external experiences, elevated overall self-compassion [41.66 vs. 38.45; $F(2, 56) = 10.80$, $p < 0.001$, $\eta^2 = 0.278$], greater mindful awareness [7.69 vs. 7.24; $F(2, 56) = 4.10$, $p = 0.022$, $\eta^2 = 0.211$], enhanced common humanity (or interconnectedness to others) [7.59 vs. 6.59; $F(2, 56) = 7.48$, $p = 0.001$, $\eta^2 = 0.128$], and better quality of life [32.31 vs. 28.79; $F(2, 56) = 11.89$, $p < 0.001$, $\eta^2 = 0.298$] among treatment group participant at 12-weeks follow-up compared to baseline. Effect sizes of these changes were large. These findings reflect the positive residual effects of MCAT, as well as its ability to generate new treatment benefits beyond intervention completion. Details of one-way ANOVAs are provided in **Table 4**.

TABLE 2 | Participant demographic information.

Demographic characteristic	Immediate treatment	Waitlist control
	(*n* = 29)	(*n* = 27)
	Mean (*SD*) or *N* (%) or Range	
Age in years, Mean (SD)	43.52 (11.54)	45.27 (10.39)
Range	23 to 65 years	28 to 61 years
Gender (Female)	22 (75.8614)	20 (74.07)
Marital Status		
Single/Divorce/Widowed	11 (37.93)	15 (59.26)
Married	18 (62.07)	12 (44.84)
Education		
High School/College	6 (20.7)	7 (25.9)
Bachelor's degree	17 (58.6)	14 (40.7)
Master's degree	4 (13.8)	8 (29.6)
Doctorate's degree	2 (6.9)	1 (3.7)
Religion		
Catholic	6 (20.69)	0
Christian	11 (37.93)	13 (48.15)
Buddhist	5 (17.24)	5 (18.52)
Taoist	2 (6.90)	1 (3.70)
Muslim	1 (3.45)	1 (3.70)
Hinduism	4 (13.79)	4 (14.81)
No religion	0	3 (11.11)
Professional Roles		
Physicians	5 (17.24)	3 (11.11)
Nurses	17 (58.62)	10 (37.04)
Medical Social Workers	3 (10.34)	5 (18.52)
Personal Care Workers	2 (6.9)	3 (11.11)
Allied Health Workers	2 (6.9)	6 (22.22)
Years of Experience in EoL Care (SD)	5.63 (5.86)	4.44 (5.52)
Range	1 to 30 years	1 to 25 years
1 to 5 years	20 (68.96)	19 (70.37)
6 to 10 years	7 (24.14)	6 (22.22)
10 years of above	2 (6.88)	2 (7.41)

Qualitative Findings

The qualitative data from the group sharing among MCAT participants, together with their creative and reflective writing supported by their art works, provided further insights on the intervention's efficacy and therapeutic mechanisms in reducing burnout, building resilience, nurturing compassion, and fostering collegial support. The following section provides an illustrative summary of the qualitative findings generated through thematic analysis.

Reducing Burnout

The multimodal therapeutic nature of MCAT provided participants with the much-needed time and space to reflect on their own self-care needs and what they can do to alleviate work-related stress. For instance, a 54-year-old medical social worker shared that "*You are expected to fill up quite a lot of shoes… and that's why it's so important to put yourself first you know, and care for yourself first.*" Such self-reflection led to a deepened self-understanding and a renewed appreciation for mindful living for calming the emotional burden of end-of-life caregiving. A 47-year-old physician shared *"Our work is filled with strong emotions… Sometimes we really have to pause and just breathe, breathe in peace, calmness and awareness, before we can perform our task again.*" Upon deep reflection followed by the creation of a Mandala of Self-Care and reflective art observation (see **Figure 2A**), a 36-year-old nurse described in her reflective writing that caring for oneself can be as simple as paying attention to one's emotion in the immediacy of one's experience: "*We need to live not in the past nor the future, but in the present.*" These vivid art-based narratives highlight the efficacy of MCAT in burnout reduction and the promotion of mental health self-care.

TABLE 3 | Outcome comparisons between treatment and control groups using mixed model ANOVAs.

Variables	Immediate treatment ($N = 29$)		Waitlist control ($N = 27$)		Group Effect			Time Effect			Group x Time Interaction		
	T1 Means *(SD)*	T2 Means *(SD)*	T1 Means *(SD)*	T2 Means *(SD)*	*F* ratio	*df*	η^2	*F* ratio	*df*	η^2	*F* ratio	*df*	η^2
Primary Outcomes													
Burnout (MBI-GS)	49.1 (12.04)	45.83 (11.66)	46.37 (12.73)	46.22 (13.11)	0.11	1	0.002	3.27*	2	0.057	1.15	2	0.021
Exhaustion	20.79 (6.59)	16.48 (5.79)	17.78 (5286)	17.48 (6.05)	0.52	1	0.010	9.13***	2	0.145	3.76*	2	0.065
Cynicism	12.83 (6.44)	12.69 (5.29)	13.96 (5.19)	13.11 (4.54)	0.51	1	0.009	0.59[a]	1.66	0.011	0.13[a]	1.66	0.002
Professional Efficacy	32.52 (6.44)	32.48 (5.29)	33.37 (5.19)	33.22 (4.54)	0.61	1	0.011	0.01	1.58	<0.001	0.25[a]	1.58	0.005
Resilience (ERS-11)	39.34 (5.518)	41.52 (5.67)	42.30 (5.34)	42.26 (5.69)	2.40	1	0.043	2.95[†]	1.8	0.052	2.96[†]	1.8	0.052
Active Engagement	13.48 (3.23)	14.48 (3.07)	14.48 (2.56)	14.33 (2.87)	0.65	1	0.012	1.66	2	0.030	2.52	2	0.045
Performance under Stress	5.69 (1.34)	6.00 (1.31)	6.22 (1.09)	6.15 (1.07)	1.77	1	0.032	0.68	2	0.012	0.93	2	0.017
Problem Solving	10.93 (2.05)	11.55 (2.21)	12.04 (1.97)	12.11 (1.89)	3.75[†]	1	0.065	2.84	2	0.050	1.29	2	0.023
Secondary Outcomes													
Emotional Regulation (FFMQ)	15.85 (2.36)	16.89 (2.34)	16.43 (1.95)	16.37 (2.19)	<0.001	1	<0.001	11.03***	2	0.170	5.34**	2	0.170
Observing	3.29 (0.72)	3.57 (0.75)	3.28 (0.69)	3.25 (0.88)	0.91	1	0.016	3.99*	2	0.069	2.18	2	0.039
Describing	3.00 (0.66)	3.25 (0.64)	3.36 (0.67)	3.45 (0.79)	1.85	1	0.033	8.24***	2	0.132	1.68	2	0.030
Acting with Awareness	3.41 (0.69)	3.53 (0.56)	3.56 (0.72)	3.53 (0.61)	0.03	1	0.001	0.44	1.78	0.008	1.40	1.78	0.025
Nonjudging	2.90 (0.66)	3.08 (0.72)	2.90 (0.71)	2.85 (0.77)	0.84	1	0.015	2.79[†]	2	0.049	1.19	2	0.022
Nonreactivity	3.25 (0.65)	3.46 (0.58)	3.33 (0.62)	3.29 (0.66)	0.12	1	0.002	1.19	1.70	0.022	5.32a**	1.70	0.090
Self-Compassion (SCS)	38.45 (7.51)	42.24 (8.09)	39.26 (6.41)	47.78 (6.09)	<0.001	1	<0.001	14.29***	2	0.209	0.61	2	0.011
Self-Kindness	7.14 (1.81)	7.75 (1.53)	7.26 (1.40)	7.22 (1.53)	0.10	1	0.002	0.93	2	0.017	1.51	2	0.027
Self-Judgment	5.86 (1.87)	5.17 (1.96)	6.11 (1.39)	5.70 (1.49)	0.76	1	0.014	2.84[†]	2	0.050	0.32	2	0.006
Common Humanity	6.59 (1.74)	7.55 (1.70)	6.96 (1.82)	7.52 (1.37)	<0.001	1	<0.001	7.20**	1.77	0.118	1.00[a]	1.77	0.018
Isolation	6.03 (1.52)	5.76 (1.85)	5.56 (1.55)	5.00 (1.84)	1.86	1	0.033	2.02	2	0.036	0.87	2	0.016
Mindfulness	7.24 (1.48)	7.83 (1.37)	7.44 (1.37)	7.93 (1.27)	0.28	1	0.005	4.78**	2	0.081	0.042	2	0.001
Overidentified	6.62 (1.80)	5.97 (1.61)	6.70 (1.79)	6.19 (1.73)	0.26	1	0.005	7.57**	2	0.123	0.10	2	0.002
Death Attitude (DAP-R)													
Fear of Death	22.41 (8.99)	20.48 (6.78)	21.07 (9.37)	21.00 (8.52)	0.001	1	<0.001	1.84	2	0.033	0.88	2	0.016
Death Avoidance	11.93 (7.16)	11.14 (6.17)	11.04 (5.15)	11.85 (5.27)	0.08	1	0.001	0.02	1.8	<0.001	1.99	1.8	0.035
Neutral Acceptance	19.52 (2.34)	19.59 (2.11)	19.11 (3.14)	19.93 (1.77)	0.22	1	0.004	1.80	1.7	0.032	1.88	1.7	0.034

(Continued)

TABLE 3 | Continued

Variables	Immediate treatment (*N* = 29)		Waitlist control (*N* = 27)		Group Effect			Time Effect			Group x Time Interaction		
	T1 Means (*SD*)	T2 Means (*SD*)	T1 Means (*SD*)	T2 Means (*SD*)	*F* ratio	*df*	η^2	*F* ratio	*df*	η^2	*F* ratio	*df*	η^2
Approach Acceptance	38.97 (10.55)	42.03 (10.51)	38.41 (13.46)	39.07 (13.94)	0.02	1	<0.001	3.06[†]	1.7	0.054	4.22*	1.7	0.072
Escape Acceptance	22.21 (6.47)	22.41 (7.69)	21.37 (8.82)	21.81 (9.43)	0.266	1	0.005	2.25	2	0.040	0.38	2	0.007
Personal Acceptance	9.90 (3.07)	10.45 (3.08)	10.48 (2.88)	10.78 (3.40)	0.51	1	0.009	0.062	2	0.011	0.08	2	0.001
Afterlife Belief	10.41 (3.47)	11.21 (2.85)	10.04 (3.04)	9.78 (3.53)	0.43	1	0.008	0.47	2	0.009	3.97*	2	0.068
Quality of Life (EURO-QOL-8)	28.79 (4.69)	31.07 (3.92)	30.74 (4.37)	31.74 (3.10)	0.67	1	0.012	14.51***	2	0.212	2.98[†]	2	0.052

*$p < 0.05$; **$p < 0.01$ and ***$p < 0.001$.
[†]*Partial significance.*
[#]*Greenhouse-Geisser correction was used when the data violated the assumption of sphericity.*

Building Resilience

Understanding one's sources of stress, illustrating this profound feeling *via* expressive arts, and thereafter articulating the experience through words empowered participants to build internal strengths and resources for coping with work-related stress. A 32-year-old social worker shared *"I wanted to be able to embrace my stress instead of fixing my stress… I feel now (after reflective art-making) I can actually cope with stress better."* This augmentation of reflective self-awareness with creative self-expression rendered through the MCAT integrative model also enabled participants to look at their experience of loss and grief with greater acceptance and psychological flexibility. A 42-year-old nurse wrote about her experience with losing a patient, *"When all is drowning and sinking in adversity, we need to be still and persevere, to embrace the trapping moves and see them as a dance of life."* Being able to transform one's cognitive appraisal of adverse events through creating a Symbol of Stress as represented by an active volcano and thereafter changing it into a lush forest through the transformative art exercises (see **Figure 2B**), a 28-year-old medical social worker expressed in her reflective writing, "*Stress may not be a bad thing, it can bring out the brilliance in people."* MCAT's capability and mechanisms for resilience building are accentuated by the arts and narratives of all study participants.

Nurturing Compassion

Mindfulness practices coupled with theme-based guided imagery rendered through MCAT provided a nurturing platform for participants to develop greater empathy and kindness for themselves and for their patients. A 54-year-old nurse shared "*When I am focusing on breathing through my nose… it made me think about my patient who was really struggling for a breath… I came to appreciate the gift of breathing."* Participants were able to integrate their own experiences with that of their patients – this sparked an awareness and acknowledgment of the interconnectedness and common humanity between them and their patients. A 58-year-old nurse shared *"The journeys of illness are long and waving, there are many ups and downs… many patients struggle to find peace and hope… I wish for them to be safe and calm."* In creating a Symbol of Limitation that illustrates the challenge and stagnation one had experienced in support dying patients (see **Figure 2C**), a 53-year-old physician shared in his reflective writing, *"While I want to hold on to the hands of the vulnerable, I also recognize that I myself am a vulnerable being who needs love and support."* Such eloquent and honest narratives underscore MCAT's capacity in not only nurturing compassion for others, but also compassion for self.

Fostering Collegial Support

The weekly scaffolding of deepened self-reflection, art making, and group sharing empowered participants to tell their own unique stories as an end-of-life caregiver, while seeing the connection between their own experiences with those of their group members. This mechanism allowed participants to take a bird's eye view of their collective challenges while finding ways to attain better mental health. A 60-year-old nurse shared

TABLE 4 | Within treatment group analysis using one-way ANOVAs.

Variables	T1	T2	T3	ANOVA		T1 vs. T2		T1 vs. T3	
	Means (*SD*)	Means (*SD*)	Means (*SD*)	*F* ratio	η^2	95% Confidence interval	Difference (T2 – T1)	95% Confidence interval	Difference (T3 – T1)
Treatment Group (N = 29)									
Primary outcomes									
Burnout (MBI-GS)	49.10 (12.056)	45.83 (11.66)	45.48 (12.80)	3.37	0.107	(–6.68, 0.13)	–3.276†	(–7.94, 0.70)	–3.621
Exhaustion	20.79 (6.59)	16.48 (5.79)	16.76 (5.44)	13.72***	0.329	(–5.64, –0.98)	–3.310**	(–5.72, –2.35)	–4.034***
Cynicism	12.83 (6.44)	12.69 (5.30)	12.24 (4.83)	0.16	0.006	(–3.53, 3.26)	–0.138	(–3.50, 2.33)	–0.586
Professional Efficacy	32.52 (5.42)	32.48 (5.87)	32.10 (7.28)	0.07	0.003	(–2.14, 2.07)	–0.034	(–4.16, 3.33)	–0.414
Resilience (ERS-11)	39.34 (5.52)	41.52 (5.67)	40.48 (6.74)	3.84[a]	0.121	(0.56, 3.78)	2.172**	(–1.32, 3.60)	1.138
Active Engagement	13.48 (3.23)	14.48 (3.07)	14.00 (3.36)	3.12	0.100	(–0.01, 2.01)	1.000†	(–0.67, 1.71)	0.517
Performance under Stress	5.69 (1.34)	6.00 (1.31)	5.93 (1.10)	1.23	0.042	(–0.23, 0.85)	0.310	(–0.32, 0.80)	0.241
Problem Solving	10.93 (2.05)	11.55 (2.21)	11.38 (2.19)	1.89	0.063	(–0.24, 1.48)	0.621	(–0.52, 1.42)	0.448
Secondary outcomes									
Emotional Regulation (FFMQ)	15.85 (2.36)	16.89 (2.34)	16.98 (2.19)	12.65***	0.311	(0.47, 1.61)	1.039***	(0.40, 1.86)	1.126**
Observing	3.29 (0.72)	3.57 (0.75)	3.59 (0.72)	6.09**	0.179	(0.03, 0.52)	0.276*	(0.03, 0.58)	0.302*
Describing	3.00 (0.66)	3.25 (0.64)	3.34 (0.66)	9.82***	0.260	(0.06, 0.44)	0.250**	(0.12, 0.56)	0.341**
Acting with Awareness	3.41 (0.69)	3.53 (0.57)	3.58 (0.53)	1.74[a]	0.059	(–0.10, 0.35)	0.125	(–0.12, 0.47)	0.172
Nonjudging	2.90 (0.66)	3.08 (0.72)	3.20 (0.71)	4.10	0.128	(–0.04, 0.40)	0.181	(0.02, 0.59)	0.306*
Nonreactivity	3.25 (0.66)	3.46 (0.58)	3.26 (0.59)	4.56[a]	0.140	(–0.01, 0.42)	0.207†	(–0.23, 0.24)	0.005
Self-Compassion (SCS)	38.45 (7.51)	42.24 (8.09)	41.66 (6.19)	10.80***	0.278	(1.26, 6.33)	3.793**	(1.11, 5.30)	3.207**
Self-Kindness	7.14 (1.81)	7.76 (1.53)	7.31 (1.65)	2.43	0.080	(–0.18, 1.42)	0.621	(–0.61, 0.95)	0.172
Self-Judgment	5.86 (1.87)	5.17 (1.97)	5.76 (1.33)	2.55	0.084	(–1.59, 0.21)	–0.690	(–0.91, 0.70)	–0.103
Common Humanity	6.59 (1.74)	7.55 (1.70)	7.59 (1.43)	7.48**	0.211	(0.16, 1.77)	0.966*	(0.18, 1.82)	1.000*
Isolation	6.03 (1.52)	5.76 (1.85)	5.48 (1.43)	1.78	0.060	(–1.14, 0.59)	–0.276	(–1.22, 0.11)	–0.552
Mindfulness	7.24 (1.48)	7.83 (1.37)	7.69 (1.39)	4.10*	0.128	(0.07, 1.10)	0.586*	(–0.11, 1.01)	0.448
Overidentified Death Attitude (DAP-R)	6.62 (1.80)	5.97 (1.61)	5.69 (1.49)	4.49	0.138	(–1.46, 0.15)	–0.655	(–1.88, 0.14)	–0.931†
Fear of Death	22.41 (8.99)	20.48 (6.78)	19.86 (7.40)	2.63	0.086	(–5.06, 1.20)	–1.931	(–5.47, 0.37)	–2.552
Death Anxiety	11.93 (7.16)	11.14 (6.17)	10.86 (5.95)	1.01	0.035	(–2.63, 1.04)	–0.793	(–3.16, 1.02)	–1.069
Neutral Acceptance	19.52 (2.34)	19.59 (2.11)	18.79 (2.56)	1.96[a]	0.065	(–0.72, 0.86)	0.069	(–2.04, 0.60)	–0.724
Approach Acceptance	38.97 (10.55)	42.03 (10.51)	39.52 (11.58)	6.83**	0.196	(0.82, 5.32)	3.069*	(–1.87, 2.97)	0.552
Escape Acceptance	22.21 (6.48)	22.41 (7.69)	24.17 (8.38)	2.79	0.091	(–2.11, 2.53)	0.207	(–0.62, 4.55)	1.966
Personal Acceptance	9.90 (3.07)	10.45 (3.08)	10.17 (3.21)	0.49	0.017	(–0.97, 2.08)	0.552	(–1.69, 1.64)	0.276
Afterlife Belief	10.41 (3.47)	11.21 (2.85)	10.24 (3.29)	3.49*	0.111	(–0.34, 1.93)	0.793	(–1.16, 0.82)	–0.172
Quality of Life (EURO-QOL-8)	28.79 (4.69)	31.07 (3.92)	32.31 (4.36)	11.89***	0.298	(0.24, 4.31)	2.276*	(1.62, 5.42)	3.517***

*$p < 0.05$; **$p < 0.01$ and ***$p < 0.001$.

†*Partial significance.*

[a]*Greenhouse-Geisser correction was used when the data violated the assumption of sphericity.*

"I see happiness in all the art pieces that were created today… Happiness can be very simple, happiness in what we are content with." The emotional connections and relational bonds created were further solidified through the group mural activities in the last 2 weeks of MCAT, where participants were asked to identify art pieces that are similar in colors and compositions for developing a joint story that tells their collective experiences. In creating a small group mural on the theme of meaning (see **Figure 2D**), participants were able to expand their views on life with a more positive and fluid mindset, as they expressed

FIGURE 2 | (A) Mandala of self-care (Pastel on paper). **(B)** Transformative stress (Airdry clay). **(C)** Symbols of limitation (Pencil on paper). **(D)** Small group mural of meaning (Acrylic on canvas).

FIGURE 3 | Large group mural – 'Seasons of Life' (Acrylic on canvas).

in their reflective writing, "*We are often fixated on looking at things at horizon levels, but what we see is not all that there is. Deep down in the blue see lies beautiful fishes, high up in the heavens there is a beautiful paradise. It is up to us to find meaning of it all.*" In being able to establish a renewed sense of collective meaning, participants widened their perspectives toward life and death with less rigid attachments for greater mental wellness. A large group mural created jointly by all participants of an MCAT group together with the therapists (see **Figure 3**) were illustrated by their poem entitled "Seasons of Life," *"Let the fallen leaves be the nourishment for next spring, together in this journey of life."*

DISCUSSION

This is the first known empirical study that has developed and tested a multimodal intervention that integrates mindfulness practice and art-based therapy for protecting and supporting the mental health of healthcare workers. MCAT aims to mitigate the detrimental effects of burnout and to foster psychological resilience among the healthcare workers immersed in the field of palliative end-of-life care. Utilizing a robust waitlist RCT design, the overall quantitative findings revealed that MCAT was effective in reducing mental exhaustion, enhancing emotional regulation and nonreactivity to intrusive thoughts, and fostering positive death attitudes among immediate-treatment group participants when compared to waitlist control across time. Treatments gains on mental exhaustion and emotional regulation were maintained at 12-weeks follow-up with new benefits identified, such as improvements in the ability to observe and describe one's feelings, thoughts and emotions, practice self-compassion and mindful awareness, and experience a deepened sense of common humanity and elevated quality of life. All significant findings are marked by medium to mostly large effect sizes, reflecting the clinical efficacy and positive residual effects of the intervention. The qualitative data and vivid art-based narratives created by study participants also provided valuable insights into MCAT's therapeutic mechanisms for reducing burnout, building resilience, nurturing compassion, and fostering collegial support among healthcare workers. These findings add robust evidence to the growing literature of mindfulness practice and art-based therapy for health and wellness promotion, together with a novel, integrative, and evidence-based therapeutic modality for mental health self-care.

Interpreting the Findings

MCAT is founded upon a multimodal paradigm that amalgamates mindful contemplative reflections with art-based self-expressions as well as brief psychoeducation for instilling cognitive, emotional, and behavioral changes that gear toward healing and psychological wellbeing. The striking findings generated from this RCT can be attributed to the various therapeutic underpinnings of this innovative intervention. First, MCAT which is rooted in the foundation of mindfulness practice and art-based therapy is found to be moderately effective for reducing mental exhaustion among healthcare workers who are prone to burnout due to the often-overwhelming stress of caring for dying patients. This result is in line with the comprehensive meta-analysis conducted by Khory et al. (2013), who have identified strong evidence to support the efficacy of mindfulness-based therapies in reducing anxiety, depression, and stress among clinical populations with consolidated effect sizes ranging from small to medium in pre-post comparison and waitlist-control studies. The result is also aligned with the burgeoning body of research that has reported creative self-expression through art making and art-based narratives as an important vehicle for burnout reduction and wellness promotion among healthcare workers (Huet and Holttum, 2016; Huet, 2017; Tjasink and Soosaipillai, 2019; Kaimal et al., 2020). Of note, treatment gains in reduced mental exhaustion were not only maintained but also enhanced by a 5-folds increase in effect size at 12-weeks follow-up. These results highlight a robust maintenance effect of MCAT, where participants continued to reap intervention benefits long after treatment completion, and are reflective of the sustained efficacy of a multimodal framework that augment mindfulness practice, expressive art making, and psychoeducation.

Second, results from this study show that MCAT was highly effective in promoting overall emotional regulation and nonreactivity to intrusive thoughts among healthcare workers who are constantly exposed to immensely emotionally charged end-of-life caregiving encounters. Treatment gains for increased emotional regulation were not only maintained but also enhanced by a 2-folds increase in effect size at 12-weeks follow-up, again accentuating a strong maintenance effect of the intervention. Moreover, new robust benefits including participants' ability to observe their internal and external experiences including perceptions, feelings, and thoughts; to describe and label their feelings, sensations, and experiences with words; and to experience life with greater mindful awareness were identified at 12-weeks follow-up. These findings reveal that participants were able to obtain greater self-awareness and self-understanding not only during the treatment period but also well beyond treatment completion, as they continue to embark on a sustainable journey of self-care and personal growth amidst the daily challenges of caring and supporting the dying and the bereaved. These findings also aligned with a burgeoning of research that have identified the effectiveness of mindfulness practices in fostering emotional regulation, and especially magnetic resonance imaging studies (MRI) and functional MRI studies that show the ability of mindfulness meditations in activating brain regions that are involved in self-regulation, focused problem solving, adaptive behavior, and interoception (Boccia et al., 2015).

Third, the study findings reveal that MCAT was moderately effective in fostering positive attitudes toward death among healthcare workers who are faced with mortality on a day-to-day basis, including approach acceptance to death and the belief in the prospect of an afterlife where the deceased can be reunited with loved ones. While these impacts were not maintained at 12-weeks follow-up, possibly due to participants being continuously affected by their patients' suffering and mortality, MCAT had nonetheless provided an invaluable opportunity for healthcare workers to explore and process their feelings of grief and loss in a supportive team-based environment. Such reflective opportunities are hard to come by in conventional healthcare workplace environments, if at all. In contrast, research has consistently found that palliative care professionals do not receive adequate support in dealing with the trauma and empathy fatigue resulting from deaths of patients (Kubler-Ross, 1970; Melvin, 2015; Ho, 2021). Empathy fatigue can significantly impair ones' ability to practice their craft competently and ethically as their own wounds are continually revisited by their patients' chronic illness, disability, mortality, and loss (Stebnicki, 2008), resulting in extraordinary stress, emotional and physical exhaustions, numbness, disengagement from patients, and the inability to continue to provide quality care. By offering an open and supportive platform to reflect and discuss their stories

and experiences of grief, of which are often profound and ineffable through words but are now made accessible and articulatable through self-expressive art-based narratives, MCAT was able to create a safe space for healthcare workers to heal, to mend the wounds of their personal lives that are touched by their caregiving experiences, and to bring closure to the losses that they have encountered in their professional lives. This newly created platform and the intervention benefits that it brings can potentially be sustained through booster sessions and the establishment of regular ritualistic activities at the workplace, all of which can serve to address the collective grief experienced by the healthcare team while replenishing their empathic capacity to better cope with fatigue and burnout.

Finally, MCAT was found to have the ability to generate new and robust treatment benefits after intervention completion at 12-weeks follow-up among healthcare workers, including the cultivation of self-compassion, a deepened sense of common humanity, and elevated quality of life. While these findings are in accordance with those reported separately in research on mindful self-compassion and art-based therapy (Germer and Neff, 2013; Hass-Cohen and Findlay, 2015), MCAT removes the boundaries of intervention to form a more holistic and complete therapeutic modality that can lead to long-term benefits. Under the MCAT framework, participants can attain greater self-understanding through deeply reflecting on their past and current experiences, discover self-kindness through creative expression and articulation of their thoughts and emotions, and experience affirmation, personal growth, and collective healing by sharing their stories with supportive others in an empathic environment. All these therapeutic processes are fused to form new insights and sustainable pathways for cognitive appraisal, meaning-making, emotional regulation, self-care behaviors, and collegial support that gear toward greater mental wellbeing. This integrative mechanism further empowers narrative identity processing (Pals, 2006) for healthy personality development and positive self-transformation with difficult life experiences (McAdams, 2011).

Distinctly, the whole of MCAT is greater than the sum of its parts. Healthcare workers are not only invited to reflect on their experiences or express their minds, but also are supported through a scaffolding of intricately curated therapeutic activities that inspire continuous self-discoveries and embodied reflexive practices (Schön, 1983; Thompson and Thompson, 2008), those that can be integrated into one's way of life and endure the test of time. Reflexivity infused with self-care capacity drives cognitive, emotional, behavioral, and relational transformations for developing sustainable resilience, marked not only by the ability to recover from and develop resistance to stressful events, but also the reconfiguration of one's beliefs and value system to adapt and possibility withstand future adversities (Lepore and Revenson, 2006).

Limitations and Future Research

Despite the many promising findings generated from this RCT, a few caveats must be noted. First, this is a pilot study with a small participant sample recruited from a single healthcare institution. This study scope may have influenced the implementation and outcome of MCAT, and future research could expand the sample size and study sites to include a variety of healthcare institutions, such as acute and community hospitals, in- and out-patient hospices, as well as other residential care facilities. Second, in spite of the numerous significant positive impacts that MCAT was able to generate, results revealed that treatment group participants only experienced marginally significant improvements in the primary outcome of resilience as compared to waitlist control immediately post-intervention. This finding, or lack thereof, may be due to the way in which resilience is constructed within the ER-11 measure, which comprises active engagement with the world, performance under stress, and problem-solving repertoire. This constitution does not appear to align with how resilience is being experienced by MCAT participants, which involved cognitive reappraisal, meaning-making, acceptance, and self-kindness. Future research may consider a more fitting measurement of resilience. Third, the current implementation of MCAT is manpower intensive and requires physical in-person facilitation. With the ongoing and unrelenting global public health crisis that has imposed persistent and restrictive physical distancing measures, the popularization of telemedicine and virtual social services is inevitable and may well stay as part of the new COVID-19 normal. Thus, future renditions of MCAT need to consider a digital adaption to improve accessibility, equity, and inclusion. Finally, this study is conducted in Singapore, a multiracial, and multicultural society with distinctive variants of Asian culture and languages. Hence, future research could expand the program to different socio-cultural settings to examine MCAT's applicability and effectiveness among more diverse ethnic groups and population cohorts, including other types of caregivers, such as family careers. An ongoing study is being conducted to develop and examine a modified version of MCAT for dementia care (i.e., MCAT-DC). Concisely, a waitlist RCT design has been adopted to assess the efficacy of a 4-weekly, 10-hours, standardized, and group-based intervention for reducing caregiving stress, perceived burden, and psychological distress, while improving resilience, hope, spiritual wellbeing, and quality of life among a sample of 104 dementia family caregivers. MCAT-DC is delivered through a hybrid physical and virtual format using Zoom technology with real time programming. Future research needs to carefully consider the implementation science and target populations for enhancing acceptability and scalability in a post-pandemic world.

CONCLUSION

Protecting the mental health of healthcare workers is an urgent global public health priority as called on by the World Health Organization and major healthcare institutions around the globe (World Health Organization, 2016; Søvold et al., 2021). Particularly, those immersed in palliative and end-of-life caregiving are prone to immense levels of work-related stress and alarming burnout rates. As many healthcare workers suffer in silence with poor mental health, a trickledown effect could prove detrimental to the quality, safety, and integrity of patient care. There is currently a dearth of empirically informed and clinically proven mental health intervention for this vulnerable

population group. Findings from this study have revealed MCAT's robust clinical potential to support and improve healthcare workers' mental health through an innovative, holistic, and one-of-its-kind multimodal therapeutic framework. MCAT integrates the reflective power of mindfulness meditation with the expressive power of art-based therapy for reducing burnout, building resilience, nurturing compassion, fostering collegial support, and ultimately promoting holistic wellness. MCAT's clinical framework is standardized, well-defined, and clearly operationalized, of which can be easily applied to and adopted in different caregiving contexts for empowering mental health self-care among diverse cohorts of caregivers. This study has generated new knowledge contributing to the advancement of theories and practices in caregiver support, mental health research, mindfulness modalities, art-based interventions, and integrative psychotherapies.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, and further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the NTU Institutional Review Board (IRB). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AH, GT-H, and JP conceptualized and designed the study. AH obtained the funding, project supervision, and drafted the manuscript. GT-H, TN, GO, PC, and DD was involved in the coordination and implementation of the research study, as well as drafting of the manuscript. AH and GO delivered the MCAT intervention. TN conducted the statistical analysis. All authors contributed to data interpretation, as well as the writing and revision of the manuscript.

FUNDING

The MCAT study (grant no. M4081570.100) is funded by the Nanyang Technological University (NTU) Start-Up Grant, and the MCAT-DC study (grant ref. ARISE/2017/23) is funded by the ARISE Strategic Initiatives Fund of the Ageing Research Institute for Society and Education at NTU.

ACKNOWLEDGMENTS

The research team would like to express their heartfelt gratitude to HCA Hospice Care. Moreover, the research team is sincerely grateful to Ms. Choo Ping Ying, the dedicated staff, and student volunteers at the Action Research for Community Health (ARCH) Lab for their support in project implementation and data analysis, as well as all research participants for their generous contributions to the MCAT RCT study.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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frontiers in Psychology

ORIGINAL RESEARCH
published: 19 November 2021
doi: 10.3389/fpsyg.2021.752026

Trends in Research on Art Therapy Indexed in the Web of Science: A Bibliometric Analysis

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Aim: Despite the increase in international research in art therapy, few studies have been developed with a bibliometric approach which describe the situation regarding this area of knowledge. Thus, the aim of this study is to describe and contextualize international scientific production in the visual arts modality in the context of artistic therapies, to offer a broader and more in-depth vision of the structure of this area of knowledge through of a bibliometric analysis of the publications indexed in the core collection of the Web of Science.

Methods: This is a retrospective, exploratory and descriptive, cross-sectional study to analyze the bibliographic data retrieved from the databases of the core collection. The analysis parameters included the data corresponding to the production according to type of document, country, journal, and institution. In addition, the main lines of research were located and classified and the subject matter of the most cited articles in each of them was summarized. Four periods were selected, between 1994 and 2020, to facilitate the thematic analysis and offer an evolutionary perspective of art therapy research.

Results: A total of 563 works were published, in 250 journals, in the 63 years between 1958, when the first document was published, and April 2021. The annual growth rate was 7.3% with a mean average of 8.7 publications per year, and 83.13% of the published works were articles. A total of 1,269 authors from 56 countries were counted. The mean number of citations per document was 5.6 and the mean number of citations per document and year was 0.6. The main research domains were psychology and/or rehabilitation and the highest production on this topic was concentrated in only three journals. In general, a high degree of variability was observed in the study topics and numerous theoretical and methodological articles. The most used visual arts modalities were in the main drawing, painting and photography.

Conclusion: This work did not find previous existence of any bibliometric analysis on the international scientific production in art therapy. In general terms, there has been a substantial growth in the number of publications on the subject over the last decade. However, this research area does not appear to have peaked, but, on the contrary, is still growing and progressing despite its long history in clinical practice.

Keywords: art therapy, bibliometric, trend analysis, visual arts, health

OPEN ACCESS

Edited by:
Stephen Clift,
Canterbury Christ Church University, United Kingdom

Reviewed by:
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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *02 August 2021*
Accepted: *27 October 2021*
Published: *19 November 2021*

Citation:
Rodriguez Novo N, Novo Muñoz MM, Cuellar-Pompa L and Rodriguez Gomez JA (2021) Trends in Research on Art Therapy Indexed in the Web of Science: A Bibliometric Analysis. Front. Psychol. 12:752026. doi: 10.3389/fpsyg.2021.752026

INTRODUCTION

As a result of international research in art therapies, they are increasingly being accepted as a health promoting practice (Stuckey and Nobel, 2010; Jensen and Bonde, 2018). Scientific evidence in this regard shows that these types of interventions positively influence both physical and psychological health, while improving social relationships (Stuckey and Nobel, 2010; Jensen and Bonde, 2018). In general terms, art therapy is a type of intervention that uses the creative process as a way to meet a therapeutic objective where different artistic disciplines can come together, as an instrument at the service of the healing process (Gacto and Gacto, 2012).

According to the Spanish Professional Association of Art Therapists, "Art therapy is a form of therapy that uses visual and artistic languages to facilitate the containment, exploration and resolution of conflicts. It is a healthcare profession, characterized by the use of artistic means and processes, to help contain and solve people's emotional or psychological conflicts. In art therapy, the artistic creation process and the resulting objects act as intermediaries in the therapeutic relationship, allowing certain conflicting feelings or emotions to find complementary or alternative ways of expression to the word. The fields of application of art therapy extend to health, education and social assistance."

On the other hand, the American Art Therapy Association (AATA) (American Art Therapy Association, 2021), defines art therapy as follows: "Art therapy provides the opportunity for non-verbal expression and communication, on the one hand, through involvement to solve emotional conflicts as well as to promote self-awareness and personal development." It is about using art as a vehicle for psychotherapy, helping the individual to find a more compatible relationship between their inner and outer world.

Therefore, art therapy is understood to be a means by which an individual to know themselves, it requires an accompaniment of the person (in their process of inner growth) and a help for the person with social, educational, personal difficulties, through their artistic production, in such a way that the work carried out generates a process of transformation of the individual him or herself.

Different clinical guidelines of the National Institute for Health and Care Excellence (NICE) include art therapy as an indication with recommended evidence. Similarly, since the beginning of the 21st century, art therapy has been recognized in the Nursing Interventions Classification (NIC), as a Nursing intervention. Butcher et al. (2018), call it "Art Therapy" (4330), and it is defined as "the facilitation of communication through drawings or other forms of art."

As complementary therapies, the different modalities of art therapy, among which are the visual arts, music therapy, dance therapy and drama therapy, are used to treat different psychological or cognitive behavioral disorders such as depression, stress, anxiety or neurological symptoms such as those caused by strokes (Wallace et al., 2004; Ozdemir and Akdemir, 2009; Hughes and da Silva, 2011; Eum and Yim, 2015; Sarid et al., 2017; Jang et al., 2018) or disorders derived from chronic diseases such as diabetes (Tang et al., 2021). These therapies provide benefits not only in the treatment or rehabilitation of the disease but also in the prevention of both certain disorders and the complications derived from them. Thus, different government agencies worldwide have drawn up evidence-based public policy documents that not only recognize the value of these interventions as alternative therapies, but also include their use in their recommendations (Galletly et al., 2016; Scottish Intercollegiate Guidelines Network, 2016; Sall et al., 2019).

In the specific case of the visual arts modality (drawing, illustration, painting, collage, photography and sculpture), art therapy not only prevails as a clinical intervention tool (Cheng et al., 2021; Hass-Cohen et al., 2021; Tang et al., 2021) but also as a diagnostic tool (Akhavan Tafti et al., 2021; Goldner et al., 2021; Grenimann Bauch and Bat Or, 2021), which gives it a versatile and innovative character, and which distinguishes it from the other art therapy modalities. Bearing in mind the above, and given the variety of studies and publications in this regard, it is of interest to have a more in-depth view of the scope and characteristics of the existing research; bibliometrics is the ideal instrument for this objective since by using bibliometric indicators, it is possible to evaluate scientific activity in any discipline or area of knowledge, and thus determine different basic categories that define who the producing people, institutions or countries are, how much they produce, what the impact of their publications is and how they collaborate with each other (Rodríguez Gutiérrez and Gómez Velasco, 2017).

After a thorough search of the literature, no research was found that involved a bibliometric study on scientific production in the visual arts modality within art therapy, therefore, this study could provide valuable information regarding the state of the question at hand in world research on the subject. Thus, the objective of the authors was to describe and contextualize international scientific production in the visual arts modality in the context of artistic therapies, to offer a broader and in-depth vision of the structure of this area of knowledge through a bibliometric analysis of the publications indexed in the core collection of the Web of Science (WoS), owned by Clarivate Analytics.

MATERIALS AND METHODS

Design

This is a retrospective, exploratory and descriptive, cross-sectional study.

Sample

Bibliographic data retrieved through a search strategy from databases including the core collection of the WoS were analyzed for the study. The data set included a total of 563 references.

Data Source

After a selection process and subsequent decision-making, it was agreed that the WoS would be the most appropriate platform for data extraction, since it is a fundamental source of information

for the evaluation of the research (Archambault et al., 2009). On the other hand, there is access to it, which from an operational point of view is essential to be able to obtain the necessary data. In addition, from a content point of view, its complete bibliographic data is available to develop a bibliometric analysis, and as such it is a widely used resource for this end (Archambault et al., 2009).

Search Strategy

In order to define the search strategy, different preliminary tests were conducted using the advanced PubMed search, until a balance was achieved between the sensitivity and specificity of the results. The first step was to test the combination (art-therapy OR "Art Therapy"), once the first 100 results had been reviewed, it was concluded that it was necessary to add specific terms on visual arts to the strategy since the aim of the search was to identify publications on interventions with artistic therapies using visual techniques.

Finally, a search strategy was designed to obtain the corpus of information using the following combination of keywords: (art-therapy OR "Art Therapy") AND (picture OR artwork OR illustrate OR photography OR painting OR paint OR "art galleries" OR "plastic arts" OR sculpture OR drawing OR draw).

Selection criterio:

Inclusion: as the present work is a type of analysis that aims to describe the state of the art in research in this domain, the objective of the search was to retrieve publications on the use of the visual arts as an art therapy technique, whether or not it is combined with another type of treatment, in any age group, within the health, educational or community sphere, without limits of year, country, etc.

Exclusion: any publication that does not refer to fine arts as an art therapy technique.

The search was conducted in the subject and title fields, with no date limit. The final execution date of the search was April 13, 2021.

Data Extraction

As the database only allows the exportation of references in batches of 500, the results were downloaded twice and later, with the help of the Notepad++ for Windows text editing program, both downloads were merged into a single file for subsequent analysis. On the one hand, an Excel database was created in which the different fields of each record were categorized as follows: author names, title, source journal, abstract, organization, keywords, references, and page numbers.

Analysis Methods

The analysis was performed by importing the data in txt format into an Excel spreadsheet using the function of obtaining external data. The analysis parameters included the data corresponding to the production by type of document, country, journal and institution. In addition, the main lines of research were identified and classified and the subject matter of the most cited articles in each of them was summarized.

The research lines were identified by dividing the corpus of analysis into different periods of 5 or 6 years, according to the publication dates of the articles. Keywords were identified and grouped by year, starting with 1994, the year when the first keywords were reported within the data retrieved for the analysis. After the periods had been defined, the main characteristics of the publications were identified through text mining in terms of the subject matter they address, the target population, the intervention environment, the pathologies treated and the type of art technique used.

Validity, Reliability, and Rigor

Two researchers developed the selection process independently, with the aim of ruling out duplicate or incomplete references or those that did not exactly fit the study objective. In the case of differences, the investigators tried to reach an agreement with each other or requested arbitration from a third party.

TABLE 1 | Description, search characteristics, and results found in art therapy.

Description	Results
Main information about data	
Timespan	1958:2021
Sources	250
Documents	563
Mean average years from publication	8.72
Mean average citations per documents	5,595
Mean average citations per year per doc	0.5987
References	1
Document types	
Article	438
Article; book chapter	18
Article; early access	6
Article; proceedings paper	6
Book	1
Book review	12
Editorial material	6
Letter	2
Meeting abstract	8
Proceedings paper	38
Reprint	2
Review	26
Document contents	
Keywords Plus (ID)	687
Author's Keywords (DE)	1432
Authors	
Authors	1269
Author appearances	1495
Authors of single-authored documents	181
Authors of multi-authored documents	1088
Authors collaboration	
Single-authored documents	198
Documents per author	0.444
Authors per document	2.25
Co-authors per documents	2.66
Collaboration index	2.98

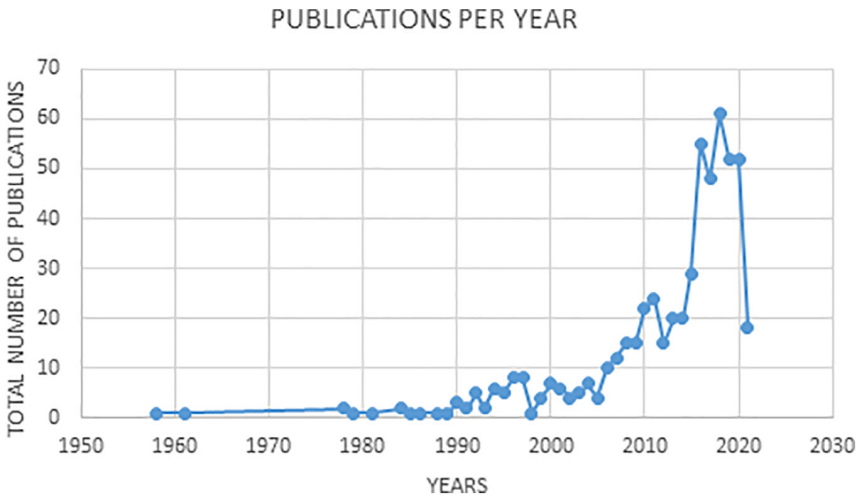

FIGURE 1 | Evolution of the frequency of publications in art therapy over time.

RESULTS

Descriptive Analysis

A total of 563 works were published, in 250 journals, in the 63 years between 1958, when the first document was published, and April 2021. The annual growth rate was 7.3% with a mean average of 8.7 publications per year and 83.13% of the published works were articles. The first article indexed in the reference database was published in the International Journal of Group Psychotherapy in 1958 (Potts, 1958). English with 507 (90.05%) publications was the main language of the publications, followed in second place by Spanish with 15 (2.66%), German was third with 14 (2.49%), and French was fourth with 11 (1.1%). A total of 1,269 authors from 56 countries were counted. The mean average number of citations per document was 5.6 and the mean average number of citations per document and year was 0.6. The description of the type of publication and search characteristics is shown in **Table 1**.

Evolution Over Time

Between 1958, when the first work was published, and 1977, only two articles were published. As of 1978, production fluctuated which lasted until 2005, when a clear upward trend began (Quinn et al., 2013), which accelerated in 2012. The most productive year was 2018 when 61 papers were published. The evolution of the publications can be seen in **Figure 1**.

Distribution by Countries

An analysis was conducted by countries regarding the state of publications on art therapy. The results showed that, in the 63-year time window, from 1958 to 2021, authors from 53 countries participated with the United States, with 316 publications, leading the ranking of the most productive countries, followed by Israel (99) and the United Kingdom (69), in second and third place, respectively. **Table 2** shows the countries with a minimum of 10 publications on the subject of study. In general terms, the United States was at the forefront in art therapy research, not only in terms of the volume of publications but also in terms of the number of citations received.

Distribution by Journals

Regarding the 250 journals that published works on art therapy, only three, belonging to the psychology and/or rehabilitation research domains, concentrated the largest production on this topic. **Table 3** shows detailed information on the most productive journals in Art therapy.

TABLE 2 | Scientific production in art therapy, by country, with a minimum frequency of 10 publications.

Country	Frequency	Total citations	Mean average article citations
United States	316	1145	6,939
Israel	99	255	5,543
United Kingdom	69	287	7,972
Germany	66	224	9,333
Australia	55	174	6,692
China	55	88	3,826
Korea	45	147	6,682
Netherlands	40	24	2.4
Spain	27	10	0.833
Iran	26	14	1,556
Sweden	25	96	13,714
Canada	25	34	3.4
Italy	24	85	6,538
France	17	6	0.667
Poland	16	17	2,429
Russia	15	1	0.167
Japan	14	60	7.5
Turkey	14	15	3
Denmark	12	53	8,833
Serbia	10	14	2.8

Figure 2 shows a scatter diagram illustrating the quantitative relationship between the 250 journals and the 563 scientific articles analyzed in the study.

Distribution by Institutions

In total, 639 institutions were recorded, which were classified into three performance levels. Of these, 466 (72.8%) were small producers, with only one published work, 169 (26.41%) were medium producers, with between two and ten works, and only 0.63%, with more than 10 works, were large producers. Of the four most productive institutions, two were from the United States, one from Israel, and one from Korea. **Figure 3** is a graph with information on the four most productive institutions.

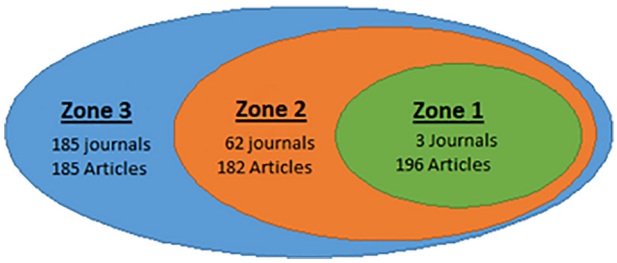

FIGURE 2 | Scatter diagram of journals and articles on art therapy retrieved through the core WoS collection. Total number of journals: 250, total number of articles: 563.

Distribution by Authors

A total of 1,269 authors were counted, of which 181 corresponded to authors of single-author documents and 1,088 were authors of multiple-author documents. Regarding all the analyzed documents, 1,495 signatures were classified with a range of signatures per document from 1 to 12 signatures. The most productive author with nine papers was Seong-in Kim, from Korea University in Seoul, South Korea. **Table 4** shows the authors with the highest scientific production in art therapy.

As can be seen in **Figure 4**, almost 90% of the authors are transient authors, with only one publication.

Of the nine papers with a minimum of 50 citations, four were published in psychology journals, three in biomedical journals, and two in interdisciplinary journals. The journals The Arts in Psychotherapy and Psycho-oncology, monopolized 44.44% of the most cited works, with two articles each. Regarding the topic discussed, it was found that four of the most cited works were related to oncological issues, three to mental health, one related to nursing and another to gender violence. **Table 5** shows the information related to the authors, topics covered, and citations.

Distribution by Research Areas

Of the 81 research areas in which works have been published on the art therapy modality that is being analyzed here, clinical psychology and rehabilitation are noteworthy as they account for 70.2% of all publications on the subject. **Table 6** shows the results of the areas with a minimum of ten publications.

Analysis of Keywords

In order to facilitate analysis and provide an evolutionary perspective of art therapy research, four periods were used: 1994–1999; 2000–2005; 2006–2010; 2011–2020. The year 2021 was not included because it is ongoing, and it was decided to report only the full years.

Period 1: 1994–1999

There was talk of creative arts therapies in this period and a high degree of variability is observed in the study topics, ranging from psychiatric disorders, dementia, feminism, speech disorders, palliative care, sexual abuse, disability, grief or infant migraine. Although a defined line of research was not observed, it could be said that the interventions in art therapy which took place in these early years were mainly performed in a hospital or institutional environment, with children and adolescents being the population mostly selected for this type of therapy. The techniques used also vary from drawing, collage, crafts to photography.

Period 2: 2000–2005

There is still a high degree of thematic variability. The first works on interventions in cancer patients appear in this period, as well as several publications on art therapy experiences aimed at healthy people, concerning family relationships, adopted adolescents, pregnant women and battered women. Similarly, intervention experiences in behavioral disorders, learning difficulties, victims of terrorist attacks, epilepsy, grief and psychiatric disorders such as schizophrenia and nervous anorexia and bulimia are addressed. The first publications appear here addressing the use of art therapy as a diagnostic tool, as well as extra-hospital interventions, developed on an outpatient basis in health, community or educational institutions or centers. Although a wide variety of experiences with children and adolescents is published, the adult population takes center stage. As for the techniques, the visual arts are mainly those belonging to modalities such as painting, drawing, photography, etc., but

TABLE 3 | Journals with the highest production in art therapy publications.

Main sources	*NP	Country	Research domain	**TC	h_index	***IF JCR 2019	****Q
Arts in psychotherapy	132	England	Psychology Rehabilitation	1047	17	1,322	Q3
Art therapy	40	United States	Rehabilitation	114	6	–	–
Frontiers in Psychology	24	Switzerland	Psychology	43	4	2,067	Q2

NP, number of publications; **TC, total citations; * IF JCR, impact factor in the journal citation report; ****Q, quartile.*

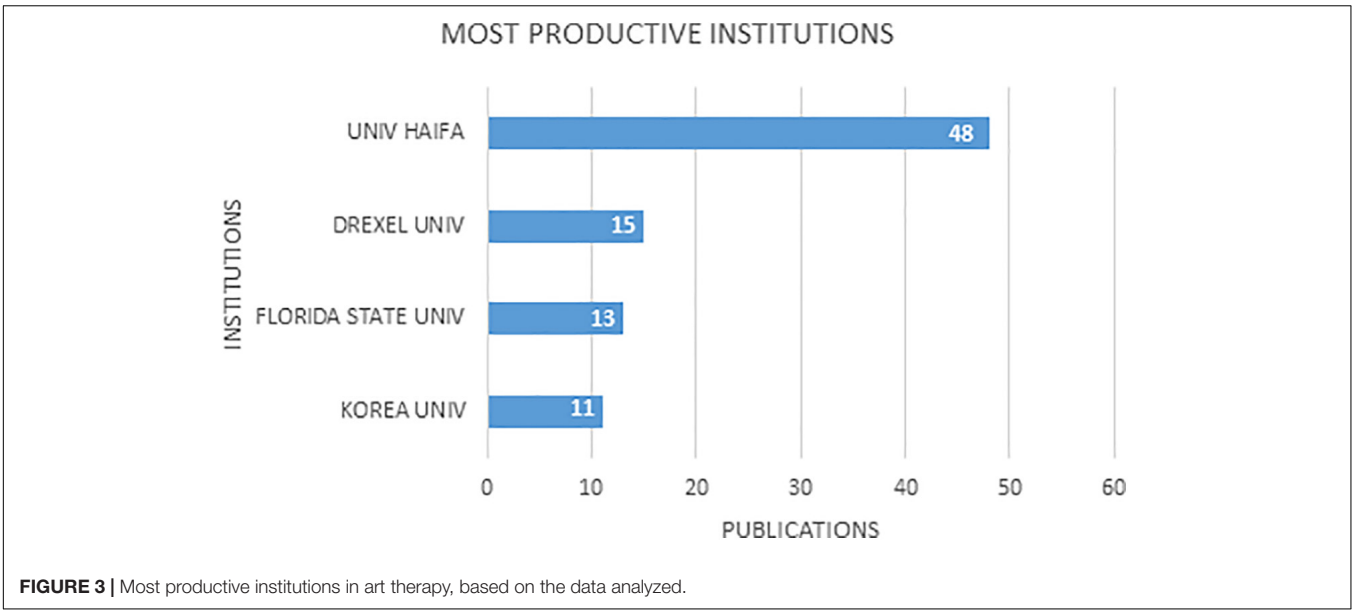

FIGURE 3 | Most productive institutions in art therapy, based on the data analyzed.

there are also descriptions of experiences of combined therapies integrating two or more types of artistic and psychological therapies such as art therapy, dance therapy, music therapy, and psychotherapy.

Period 3: 2006–2010

Numerous theoretical and methodological articles. Informatics and virtual work environments are introduced, along with digital video as a means of art therapy. Interest in the perspective of the therapist is appreciated, given the impact that their personal experiences in the therapeutic process can have on the results of the therapy. Similarly, vocational training is addressed. The publication of works on patients with serious psychiatric disorders such as schizophrenia and on cancer patients continues. Furthermore, psychopathologies such as trauma and post-traumatic stress in war veterans and in children and child sexual abuse are also addressed. Experiences on art therapy interventions in patients with chronic diseases such as HIV/AIDS, asthma and diabetes are published. Cognitive and behavioral strategies such as coping are worked on, emotional needs are addressed in frail elderly people as well as creativity in patients with dementia. Interest is maintained on the diagnostic use of art therapy through the creation and validation of evaluation tools. Outpatient, community and institutional interventions continue, including intervention experiences with prisoners. The different modalities of artistic therapies are combined with each other through the use of visual arts in all its modalities in combination with dance, music or narration, and alliances are generated with other types of therapies such as occupational therapy, cognitive therapies -behavioral, exercise, other types of complementary or alternative therapies together with healthy life strategies. There is a special interest in this period in research on the use of color, as an important factor in art therapy evaluations.

Period 4: 2011–2020

The use of computers, art materials in digital format, virtual environments and art applications for iPads and mobiles becomes consolidated in this period. Most of the interventions are aimed at adults. Thematic variety is observed in the retrieved results. The topics that generated the most attention were behavioral, psychological and communicative symptoms in patients with dementia, as well as the management of psychosocial difficulties such as fatigue, depression, anxiety and existential and relational concerns in cancer patients. Research continues into serious mental illnesses such as schizophrenia. To a lesser extent, work was published on intellectual disability, special educational needs, improvement of memory and thinking skills to achieve school competencies, socio-emotional problems in adolescents or motivation in children at risk of poverty. There was research on domestic violence and feminism, on epilepsy, childhood trauma, the constructive coping of children who go through experiences of forced relocation due to border changes, wars or natural disasters. Other topics discussed are related to

TABLE 4 | Authors and frequency of publications on art therapy.

Author	NP*	h_index	TC**
Kim SI	9	6	80
Regev D	7	3	18
Snir S	7	3	15
Huss E	6	4	37
Kaimal G	6	3	25
Hanes MJ	5	3	20
Lev-Wiesel R	5	3	14
Or MB	5	3	34
Van Hooren S	5	3	16
Von Wietersheim J	5	3	17

**NP, number of publications; **TC, total citations.*

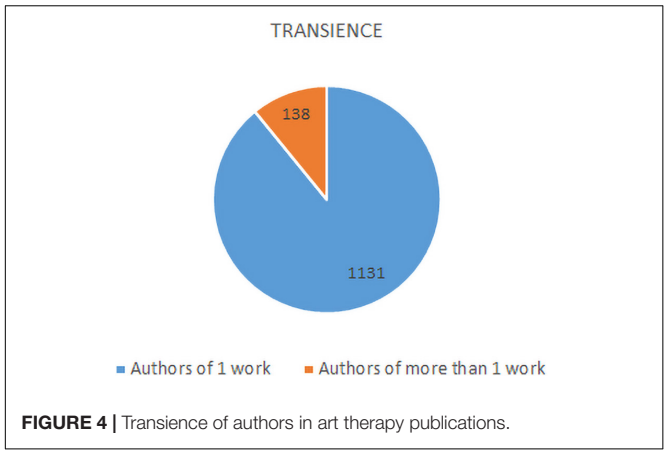

FIGURE 4 | Transience of authors in art therapy publications.

depression, psychosis, as well as the identification of types of attachment in healthy people, as well as intervention in prisoners. In addition, studies aimed at children and adolescents focused on determining the efficacy of art therapy in relation to victims of sexual abuse, orphans, symptoms of separation, anxiety disorder or social adaptation and integration. Cognitive impairment in alcoholics and the development of the identity of the LGTBI community are hardly addressed. The efficacy of the different modalities of combined artistic therapies is addressed and special interest is given to the use of computers in the field of evaluation through art therapy. In general, the modalities of visual arts are drawing, painting, photography, modeling, construction with non-conventional materials, various multimedia techniques, and animation.

DISCUSSION

The analysis of scientific production, based on bibliometric parameters, is an essential tool for evaluating knowledge and determining the progress of disciplines and their fields. In the present case, given the specificity of the subject, this type of work provides useful information to understand the general properties of the state of knowledge about art therapy (Capilla-Díaz et al., 2020), since it offers a retrospective vision of the scientific production in the world based on the main bibliometric indicators.

Taking into account the annual progression of publications, a particular dynamic is observed with some periods of growth, alternating with others of regression. However, the increase in production from 2012 onward has shown a clear growth trend. This indicates that the topic has been gradually attracting the attention of professionals and researchers.

Regarding the geographical distribution of the publications, the results of the study are equivalent to those of a bibliometric study that analyzed the last 20 years of publications on music therapy (Li et al., 2021) since the 10 countries or regions that these authors identified as the main ones are among the twenty top producing countries in art therapy, with the United States heading the list in both cases.

TABLE 5 | Reference of authors, topics covered, and citation of articles related to art therapy.

References	Summary	Total citations	Mean average per year
Bar-Sela et al., 2007	The aim of this study was to determine whether the improvement in depression, anxiety, or fatigue during chemotherapy after an anthroposophic art therapy intervention was sufficient to warrant a controlled trial.	86	5.73
Riley and Manias, 2004	The objective of this article was, through a bibliographic search, to provide a "snapshot" of the scope and uses of photography in clinical nursing practice and research.	84	4.67
Wood et al., 2011	The aim of this research work was to evaluate and synthesize the scientific evidence available for the use of art therapy in the management of symptoms in adults with cancer.	83	7.55
Geue et al., 2010	This article describes the content, concept and structure of art therapy interventions based on painting or drawing, as well as some additional methodical procedures and research results of art therapy in the field of psychosociology.	75	6.25
Favara-Scacco et al., 2001	Our goal is to prevent anxiety and fear during painful interventions, as well as prolonged emotional distress, through art therapy sessions for children with leukemia.	68	3.24
Parr, 2006	This article, based on qualitative data from in-depth interviews with artists from two Scottish mental health art projects, explores whether people with severe and long-lasting mental health problems experience belonging through their participation in a range of practices and contemporary artistic spaces.	64	4
Frohmann, 2005	This is a Scoping Review of the literature on community-centered support interventions with the aim of identifying and evaluating mental health outcomes among survivors of Intimate Partner Violence.	59	3.47
Cohen et al., 1988	Exploratory study in which a series of diagnostic drawings (DDS) was administered to 239 psychiatric hospitalized patients with a diagnosis of dysthymia, depression or schizophrenia with the objective of evaluating the link between the patients' disease based on the psychiatric diagnoses and how it is expressed in the drawings.	52	1.53
Talwar, 2007	This article, following an overview of the role of memory and emotions in trauma and theories of art creation and brain function, proposes an art therapy protocol, designed to address the non-verbal core of traumatic memory, which has been successful in integrating the cognitive, emotional and physiological levels of trauma.	51	3.4

TABLE 6 | Publications in art therapy, by research area.

Ranking	Research area	Records *	% of 563
1	Psychology clinical	211	37.48
2	Rehabilitation	184	32.68
3	Psychology multidisciplinary	73	12.97
4	Psychiatry	52	9.24
5	Psychology	25	4.44
6	Education educational research	23	4.1
7	Social sciences interdisciplinary	19	3.38
8	Health care sciences services	17	3.02
9	Nursing	17	3.02
10	Oncology	16	2.84
11	Public environmental occupational health	16	2.84
12	Integrative complementary medicine	14	2.49
13	Medicine general internal	14	2.49
14	Humanities multidisciplinary	12	2.13
15	Art	10	1.78
16	Social sciences biomedical	10	1.78

**The same work may correspond to more than one research area.*

A high degree of dispersion is observed at the journal level, fulfilling Bradford's Law, since the scientific production in art therapy presents a highly unequal distribution given that a large number of articles are concentrated in a small population of journals, while the rest of the articles are scattered over a large number of journals. On the other hand, it seems logical that the main sources in this area, Arts in Psychotherapy, Frontiers in Psychology and Art Therapy, would be the journals chosen by the authors to publish their research, considering that they are specialized journals in art therapy. In the case of Frontiers in Psychology, although it is not specific to this area of research, it does belong to the field of psychology, one of the two domains identified in the present study as being main domains. This result is also similar to that of Li et al. (2021), mentioned above, where the authors found that the leading journals in the field were specialized in music therapy and where one of the main domains was also psychology.

Although two of the four most productive institutions were from the United States, it should be noted that the leading institution in this field is an Israeli university. Most of the institutions had a low performance in the scientific production on art therapy.

The most cited articles have a main interest in addressing symptoms with a psychological component such as anxiety, fatigue, emotional anguish or fear, during the course of serious diseases such as cancer, as well as psychiatric diseases such as schizophrenia or depression. In general, there is a clear line of research that refers to mental health. In addition, the different scientific domains present different citation practices, which for reasons of normalization of the bibliometric indicators are not comparable (González and González, 2016). Therefore, based on the results of this analysis it seems that, in general terms, the research in art therapy may not have an impact maturation speed of more than 5 years. This is probably due to the fact that as an area of research, it is still being development.

Regarding authorship, the most notable result is the high transience of the authors, which also points to the low level of development in research in the area of art therapy.

Art therapy is applied to a wide spectrum of health problems, through a wide variety of artistic modalities. In the last decade of the twentieth century, interventions took place in hospital and institutional settings, in hospitalized or inpatients, and according to the studies analyzed, they were mainly aimed at children. The first outpatient experiences in art therapy appeared in 2000, when it started diversifying out of the health field into educational settings and began to be used as a preventive therapy, applied to healthy people (Robertson, 2001; Swan-Foster et al., 2003), and for diagnostic purposes, with drawing or photography being incorporated into the assessment instruments (Hays and Lyons, 1981; Kim et al., 2011; Darewych, 2013). Experiences of combined therapies integrating two or more types of artistic therapies into psychological and/or pharmacological therapy have been described. As of 2006, with the development of information technology and the internet, the virtual environment and tools in digital format started to gain momentum as a means of artistic therapy. This development in art therapy has been growing stronger since 2010, with the improvement of mobile terminals, applications for digital tablets and mobile phones.

There are no established research lines concerning the thematic variability identified in the analyzed publications. However, the scientific community seems to have been directing its research efforts toward issues related to the improvement of physical symptoms and the psychological well-being in patients with oncological pathologies. Furthermore, there are numerous studies focused on the cognitive behavioral intervention of patients with psychiatric diseases such as schizophrenia or degenerative diseases such as dementias, especially Alzheimer's. Finally, drawing, painting and photography are the most recurrent visual arts modalities.

STRENGTHS AND LIMITATIONS

The only information used in the study was retrieved from the core WoS collection. As a quantitative approach was the fundamental approach used in the development of the study, this could lead to a certain bias in the analysis of the results since the qualitative component of the publications in this research area was not taken into account.

The bibliometric approach is a good methodology to map the scientific development of the domain in terms of findings and gaps in research. A systematic review would be necessary to detail the available scientific evidence on the efficacy-effectiveness and efficiency of this type of intervention.

To the best of the authors' knowledge, this is the first study to describe the evolution of the domain through the development of its lines of research.

CONCLUSION

This work did not find the previous existence of any bibliometric analysis on the international scientific production in art therapy.

The present study shows that the number of publications on the subject has multiplied substantially over the last decade. The results here are similar to those obtained in a similar study (Li et al., 2021) which evaluated the growth of music therapy research over the last 20 years.

The bibliographic data retrieved from the databases of the core WoS collection are analyzed by applying this retrospective, exploratory, descriptive and cross-sectional study, with a bibliometric approach.

In the 63 years between 1958 and April 2021, a total of 563 works on art therapy in the visual arts were found, indexed in the databases selected for the sample of this study, with psychology and rehabilitation being the main domains research.

In addition, the ability of art to broaden personal horizons means that these disciplines are able to transcend the individual aspects present in the disease (Marxen, 2011), bestowing on artistic therapies a polyvalent, multifaceted, multidisciplinary and conceivable character regardless of the application environment, the means and objectives of intervention, as described in this work.

In sum, through the proposed analysis, the authors conclude that, despite verifying a substantial growth in the number of publications on the subject during the last decade, the interest of researchers in visual arts as therapy continues to grow and progress.

The findings may provide useful information for art therapy (visual arts) researchers to identify new research directions and topics.

DATA AVAILABILITY STATEMENT

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

All authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. LC-P and NR: conception and design of the study, acquisition of data and analysis, and interpretation of data. NR, MN, and JR: drafting the manuscript. MN and JR: revising the manuscript critically for important intellectual content. LC-P, NR, MN, and JR: approval of the version of the manuscript to be published.

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frontiers in Psychology

ORIGINAL RESEARCH
published: 09 December 2021
doi: 10.3389/fpsyg.2021.773451

Examining the Range and Scope of Artists' Professional Practices With Individuals With Palliative Care Needs: An International, Cross-Sectional Online Survey

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Background: Internationally, it is recognized that artists facilitate arts engagement with individuals with palliative care needs. There is a gap in the literature describing the range and scope of artists' professional practices in palliative care. The aim of this study was to examine an international range of professional practices among artists who work in palliative care including key professionals' perceptions of these practices.

Methods: An international, cross-sectional, online survey was conducted with health professionals, artists, and program coordinators with experience with artists working in palliative care. This survey was part of a larger mixed methods study. An instrument was systematically developed to examine artists' professional practices. Descriptive statistics were reported for the total sample including frequencies, means and standard deviations and open-ended items were analyzed thematically.

Results: 101 valid surveys were analyzed. Findings outlined: (1) who delivers the arts; (2) where and with whom; (3) practice descriptors; and (4) perceptions of practice. Themes identified from open-ended items on benefits and risks of practice revealed impacts on patients and artists alike, including: (1) enhanced well-being; (2) vulnerabilities; and (3) facilitators and barriers.

Conclusion: Findings demonstrated a wide range of artists' practices in palliative and end-of-life care, featuring notable consistencies in international practice worth further exploration. Ongoing and international efforts examining artists' practices in palliative care contribute to the development of future research, policy and practice.

Keywords: artists, arts in health, palliative care, end-of-life care, patients, cross-sectional survey

OPEN ACCESS

Edited by:
Michael Koon Boon Tan, Sheffield Hallam University, United Kingdom

Reviewed by:
Andy Hau Yan Ho, Nanyang Technological University, Singapore
Marcia Brennan, Rice University, United States

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *09 September 2021*
Accepted: *11 November 2021*
Published: *09 December 2021*

Citation:
Lee JB, McIlfatrick S and Fitzpatrick L (2021) Examining the Range and Scope of Artists' Professional Practices With Individuals With Palliative Care Needs: An International, Cross-Sectional Online Survey. Front. Psychol. 12:773451. doi: 10.3389/fpsyg.2021.773451

INTRODUCTION

It is recognized that artists facilitate arts engagement with individuals with palliative care needs in a range of settings such as hospitals and hospice (Anderson et al., 2017; Peng et al., 2019; Lee et al., 2021). Individuals with palliative care needs experience distinct impacts to their quality of life and well-being as daily routines, social connection, and a sense of identity are significantly disrupted (Sepúlveda et al., 2002; Long, 2011;

Knaul et al., 2018; Greer et al., 2020; Henson et al., 2020). In response, palliative care offers a range of modalities to address quality of life through life-affirming care with an emphasis on social support and a team approach (Meier and Brawley, 2011; World Health Organization, 2018). Evidence points to the benefits of supportive modalities such as the arts to address non-pharmacological symptom management, quality of life and meaning making (Charmaz, 2006; Long, 2011; Moss and O'Neill, 2014; Wilson et al., 2016; Peng et al., 2019). Arts engagement aligns with palliative care aims by engaging creativity and expression thereby enhancing well-being through discovery, agency, meaning, connection with others, and a sense of self beyond illness (Kennett, 2000; Charmaz, 2006; Long, 2011; Anderson et al., 2017; Peng et al., 2019). A vast body of evidence supports arts engagement for health and well-being, broadly (Staricoff, 2004; Macnaughton et al., 2005; Clift, 2012; Fancourt et al., 2014; Fancourt and Finn, 2019). A gap exists, however, in the evidence describing the range and scope of artists' professional practices in palliative and end-of-life care.

Much of the evidence underpinning artists' work in palliative care is drawn from broad health contexts such as bedside practice in hospitals or from creative arts therapies' literature (Moss and O'Neill, 2009). Field-wide definitions of arts in health aim to distinguish the professional roles of artists from creative and expressive arts therapists as drawn from the National Organization for Arts in Health's white paper (National Organization for Arts in Health, 2017), and yet these distinctions in role and scope frequently blur in practice. In this paper, the term arts in palliative care is inclusive of visual, literary, performing, and multi-disciplinary arts engagement provided by an artists with individuals with palliative care needs. Arts in palliative care is contextualized within the broader discipline of arts in health, which includes arts engagement delivered within a healthcare or clinical context, also commonly referred to as arts in medicine or arts in healthcare (Macnaughton et al., 2005; National Organization for Arts in Health, 2017; Sonke et al., 2018).

Evidence demonstrates the importance of skilled practice of artists working in healthcare (Moss and O'Neill, 2009, 2019; Sonke, 2015; Moss, 2016; Tan, 2018, 2020; Van Lith and Spooner, 2018). Delineation between the professional roles and practices of artists and creative arts therapists in palliative care serves to direct the scope of practice, education, and training needs of each (Moss and O'Neill, 2009; Van Lith and Spooner, 2018). Artists delivering the arts in healthcare settings must be skilled and knowledgeable to safely and effectively navigate within healthcare environments including following infection control protocols, documentation of practice, and interprofessional communication, for example (Moss and O'Neill, 2009; Jensen, 2014; Sonke, 2015). Tan (2018, 2020) offers a conceptual model for the practice of a "caring artist" in the context of a nursing home, pointing to the artist's capacity to attune, assess, and adjust with consideration for participant well-being, the environment, and quality arts activities. Assessment and observation, project planning, collaboration, individual and group facilitation, research, and reflexivity were identified as key components of professional practice among artists working in healthcare (Moss and O'Neill, 2009; Jensen, 2014; Tan, 2018, 2020; Van Lith and Spooner, 2018). As arts in health is not widely formalized or systematically available, communication skills and a common vernacular are also invaluable in order to translate the values and aims of arts engagement with patients for effective interprofessional collaboration (Jensen, 2014; Sonke et al., 2017, 2019). Despite this growing body of literature, there are few published studies to date describing the mechanisms and nuances of professional practice among artists working in palliative or end-of-life care settings (Tan, 2020; Lee et al., 2021).

A lack of evidence exists to describe artists' professional pathways into palliative care including training, preparation or resources to safeguard their well-being and resilience as a workforce (Moss and O'Neill, 2009; Van Lith and Spooner, 2018). This is a critical consideration and protective factor for any healthcare-based workforce (Mills et al., 2020). Therefore, there is a significant need for further conceptualization of professional practices of artists working in palliative care. This paper presents a critical examination of the international range and variation with artists' practice in palliative care, as called for in the extant literature (Raw et al., 2012; Jensen, 2014; Tan, 2020). Critical analysis of patterns of consistency and variation in artists' practice alongside facilitators and barriers reported by key professionals in arts in palliative care steers a more nuanced conceptualization of practice in an effort to inform future research, policy, and practice toward greater efforts to increase uptake of the arts in palliative care.

The aim of this study was to examine an international range of professional practices among artists who work in palliative care including key professionals' perceptions of these practices.

For the purpose of this study, key professionals included health professionals, artists, and program coordinators with direct experience with artists working with individuals with palliative or end-of-life care needs.

MATERIALS AND METHODS

An international, cross-sectional online survey was conducted to describe and examine key professionals' perceptions of the range and scope of artists' practices including education and training, art forms, settings and participant populations, and approaches to practice. This survey was part of a larger convergent parallel mixed methods study. It is underpinned by pragmatism in its intent to emphasize complementarity of quantitative and qualitative approaches toward shared meaning and joint action (Morgan, 2007, 2014; Shannon-Baker, 2016; Moseholm and Fetters, 2017). A 27-item survey instrument was designed in English using Qualtrics, a secure web-based survey platform. The survey was provided in English as this is a common language utilized by the identified international arts in health professional membership organizations through whom the survey was distributed. Ethical approvals and oversight were provided by the institutional review boards of both affiliate institutions (RG-0119 and IRB 201902947). A participant information sheet was provided at the outset of the survey and

respondents provided informed consent in the survey itself prior to commencing completion of the instrument. Survey methods and findings were reported following Eysenbach's Checklist for Reporting Findings of Internet Surveys (CHERRIES; Eysenbach, 2004).

Instrument Design and Development

As there was no existing validated survey instrument designed to systematically detail artists' practice in healthcare generally, nor in palliative care specifically, an instrument was developed. This scoping survey was designed to examine the range of practice contexts, scope of practice, multiple key descriptors of levels of arts engagement, and professional structures such as the nature of professional collaboration, documentation of practice and treatment of publicly-engaged patient created art works by art form. The development of the survey instrument was iterative, inductive, and informed by both the literature and by conferring with subject-matter experts (Wilson et al., 2016; Eva and Morgan, 2018). Testing and piloting the instrument assisted with ensuring the clarity and sequencing of each item and the length of time to completion. The researcher (J.B.L.) consulted a statistician (J.M.) to ensure that the survey instrument was designed, and the quantitative data analyzed, in a systematic and rigorous manner.

The survey instrument included 27 items categorized by domain or topic and placed in a logical order. The first and second domains focused on range and scope of practice and included 14 closed-ended questions in which respondents selected from a pre-determined list from multiple choices or a ranking scale. The last domain included four open-ended questions on perceptions of practice. The survey instrument was divided into the following sections: (1) eligibility screening and demographics such as geographical location, employment, level of education and training specific to arts in health; (2) in-depth practice descriptors such as who delivers the arts, where and with whom, number of arts sessions facilitated per week with individuals or groups by health condition and art form as well as observable changes during and following arts engagement; and (3) key professionals' perceptions of practice, including perceived benefits and risks of arts engagement in palliative care. See **Table 1** for the survey instrument.

Inclusion Criteria

Inclusion criteria required respondents to have directly engaged professionally with the arts in palliative care as either an artist, a health professional, a program coordinator, or a researcher. As stated in the background, definitions were aligned with field publications in arts in health, which defines an artist working in healthcare as distinct from a credentialed creative arts therapist (Moss and O'Neill, 2009; Sonke, 2015; National Organization for Arts in Health, 2017; Sonke et al., 2018). The survey made this delineation explicit at the outset by clearly stating that creative arts therapists should participate in the survey in the role of *health professional* rather than *artist*. An open-ended text item invited respondents to expound on their role to account for professional role variation or multiple roles. The inclusion criterion, "direct professional experience working with artists delivering arts engagement" therefore included creative arts therapists who actively made patient referrals to, or otherwise collaborated with, artists in their respective palliative or end-of-life care programs.

Sampling and Recruitment

A purposive sample of key professionals with direct experience with artists' work with individuals with palliative care needs was invited to complete a securely hosted, online survey in Qualtrics based on their specialized knowledge of the subject matter (Kalton, 1983; Ruel et al., 2015). The study was not designed to achieve statistical significance or to test a statistically representative sample. No published data was identified that articulated the number of artists working in palliative care worldwide or by region, hence the rationale for the present study. It was therefore not possible to state the confidence level and margin of error. Further, membership of the identified arts in health networks and organizations represent professionals across sectors including practitioners, health professionals, program coordinators, researchers and commissioners associated with arts in health broadly, therefore an unknown percentage of members work in palliative care.

An initial recruitment strategy included an email invitation from within each organization to the members of three international arts in health professional membership organizations: the United States-based *National Organization for Arts in Health* (n = 339 members; 2,011 newsletter subscribers); *Culture, Health and Well-being Alliance* in the United Kingdom (n = 4,395 members and newsletter subscribers); and *Arts and Health Australia* (n = *NA)*. The administrators of the *National Organization of Arts in Health* and the *Culture Health and Well-being Alliance* included the invitation in their respective e-newsletters and posted on social media platforms such as Twitter and Facebook. Respondents were encouraged to distribute the survey among their own networks. To further expand the reach, additional professional membership organizations such as the European Association for Palliative Care, Medical and Health Humanities Africa, the British Association for Art Therapists (BAAT) and the BAAT special interest group in palliative and cancer care distributed the survey through their memberships and networks *via* email and on social media.

Data Collection

The online survey remained open from November 26, 2019 through January 15, 2020. Reminder emails and social media reminders were sent following initial invitations in weeks one, two, four and six to enhance response and the survey period was extended two weeks into January 2020 to account for the holiday period. The survey stated anticipated length of time to complete and aim of the study. Ethical considerations were provided in a linked participant information sheet including study aim and details, the voluntary nature of the study, potential risks and benefits, the data management plan, and study contacts. Informed consent was collected following the participant information sheet and prior to the eligibility screening question. No incentives were provided to survey respondents for their participation. To ensure that data remained anonymous, a

TABLE 1 | Survey instrument.

1. [Screening] Have you engaged professionally with the arts in palliative care? Yes (1) No (2)
2. [Current professional role] Select one answer below that best describes your current professional role with the arts in palliative care.
   [Branching Logic-Change of role] If you have had a change of professional role, such as you are retired from practice, or are not currently working with this population, your work and knowledge is vital. Please describe your work in arts in palliative care below.
3. [Multiple roles] If you have had multiple professional roles related to the arts in palliative care, please describe in the space below.
4. [Demographics: Country of residence] In which country do you currently reside?
5. [Demographics: Education level] What is the highest level of school you have completed?
6. [Training in arts in health] Have you received training specific to delivering the arts in healthcare? Yes (1) No (2)
7. [Training in arts in health] Please briefly describe your training in delivering the arts in healthcare.
8. [Current place of employment] Which one of the following best describes your current place of employment?
9. [Years of employment] How many years have you been in your current professional role? 0–30 years slider
10. [Arts engagement by setting] In which of the following settings have you engaged with the arts? (Select all that apply.)
11. [Years of professional engagement in arts in palliative care] How many years have you been professionally involved with the arts in palliative care? 0–30 slider
12. [Artistic discipline/s] Which art forms are engaged with patients in your practice or program? Please specify in the space below.
13. [Profession of arts facilitator] Who delivers the arts with patients in your practice or program? Select all that apply.
14. [Professional collaborations to deliver the arts] Who collaborates professionally to deliver the arts in your practice or program? Select all that apply.
15. [Common health conditions among arts participants] What are some common health conditions among patients who participate? Select all that apply.
16. [# of sessions per week] Over the past year, what is the average number of arts sessions provided per week with patients in your practice or program?
17. [Average length of session] What is the average length of an arts session in your practice or program?
18. [Percentage of time spent by participant/group] Approximately what percentage of time is spent with individuals and groups in your practice or program?
    With individuals on a one-to-one basis: _____ (1)
    With groups of individuals who have a similar health condition: _____ (2)
    With groups of individuals with varying health conditions: _____ (3)
    With groups of individuals who have health conditions and their family members: _____ (4)
    With groups of individuals who have health conditions and healthcare professionals: _____ (5)
    Other – (please describe): _____ (8)
    Total: _____
19. [Age range of participants] Approximately what percentage of patients in the following age ranges engage in the arts in your practice or program?
    0–3 years of age: _____ (1)
    4–12 years of age: _____ (2)
    13–18 years of age: _____ (3)
    19–35 years of age: _____ (4)
    36–64 years of age: _____ (5)
    65 years of age or older: _____ (6)
    Total: _____
20. [Source of referrals] Approximately what percentage of the following provide patient referrals to the arts in your practice or program?
    Artist: _____ (8)
    Program coordinator: _____ (5)
    Family members or loved ones: _____ (2)
    Patient self-referral: _____ (1)
    Health professional – (please specify): _____ (3)
    Total: _____
21. [Outcomes] What if any, changes do you observe during, or immediately following, an arts session in your practice or program? Select all that apply.
    Change observed in patient health or symptoms – please specify. (1) _____
    Change observed in patient's environment such as lighting, sound, seating arrangement, etc. – please specify. (2) _____
    Change as verbalized by patient or group – please specify. (5) _____
    Other (6) _____
22. [Documentation of practices] Do artists (or those who deliver the arts) document their experience working with patients in your practice or program? Select all that apply.
    Artists document arts sessions in a medical record. (1)
    Artists document arts sessions to share with their supervisor and/or colleagues. (2)
    Artists document arts sessions for professional purposes such as record of time spent, grant reporting, annual reporting, etc. (3)
    Artists document arts sessions for research and/or evaluation purposes. (7)
    Artists document arts session for other purposes. – (please describe) (6) _____
    Artists do not formally document arts sessions. (4)
23. [Use of artworks] When a patient engages in an arts session with your program, is the artwork produced shared publicly in any form, such as an exhibit or performance?
    Yes – (please describe) (1) _____
    No – (please describe) (2) _____
24. [Meaning of palliative care in professional context] Briefly, what does the term "palliative care" mean to you in the context of your professional work?
25. [Benefits] In your view, what are the primary benefits, if any, of engaging the arts with patients in palliative care?
26. [Risks] In your view, what are the primary risks, if any, of engaging the arts with patients in palliative care?
27. [Open-ended] What else would you like to share about your professional experience engaging the arts in palliative care?W3510

separate, unlinked survey collected contact information of those respondents who wished to remain in contact for future study activities.

Data Analysis

Data were analyzed by members of the research team (J.B.L. and J.M.) using descriptive statistical analysis and thematic analysis (Braun and Clarke, 2006, 2014) and informed by a pragmatic approach (Morgan, 2007, 2014; Creswell and Creswell, 2017; Miles et al., 2018). Initial reports of the raw data were reviewed using Qualtrics, a secure web-based survey management and analysis platform. SAS 9.4 software (SAS Institute Inc., Cary, NC, United States) was used to further analyze quantitative data and generate descriptive statistics to identify characteristics of the sample and inferential statistics to determine statistical significance. As the primary objective of this project was to describe the range and scope of artists' practices with individuals with palliative care needs, descriptive statistics were reported for the total sample (frequencies, means and standard deviations). Beyond this, three variables were used for further stratification: current professional role (coded as artist, health professional, or program coordinator), country of residence (coded as United States versus non-United States), and current place of employment (coded as arts organization, hospital/inpatient, university, or other). For each stratified analysis, chi-square and Fisher's exact test statistics were reported for categorical variables.

Qualitative responses to open-ended items were coded and thematic analysis conducted in MaxQDA using six stages identified by Braun and Clarke (2006; 2014): (1) data familiarization; (2) initial coding; (3) theming; (4) review themes; (5) define themes; and (6) writing. The first author undertook line-by-line open coding to develop an initial set of codes. Codes and sub-codes aimed to capture both semantic and conceptual or latent meaning (Braun and Clarke, 2006). The codes were then organized categorically and re-coded to develop primary and secondary categories from which a set of themes were developed by the principal investigator. Discussion and verification were then undertaken by the research team to review, refine, combine, or discard themes and to ensure they were firmly grounded in the data (Lincoln and Guba, 1985, 1986). Once verified, each theme was organized into a table to display data in relation to the research question in order to facilitate theme generation. Qualitative data introduced unique insights into the perceptions of respondents as reported and discussed below.

FINDINGS

A total of 151 responses were received. After cleaning the data, removing tests (4) and duplicates (6) and accounting for those with greater than 50% missing items (40), 101 valid survey responses were analyzed in full.

Respondent Characteristics

Of the 101 surveys analyzed in full, forty-nine respondents identified willingness to participate in an interview in a subsequent study phase. For the purposes of the article, those who completed surveys reported herein were referenced as *respondents*. The term *participants* is reserved to identify individuals who participated in arts engagement such as patients, service users, or other individuals with palliative care needs.

TABLE 2 | Respondent characteristics.

The count (n) and percentage (%) are reported as n (%), unless otherwise stated.	Total (*n* = 101)
Primary professional role	
Artist	38 (37.6)
Health professional	34 (33.7)
Program coordinator	24 (23.8)
Researcher	4 (4.0)
Change of professional role	1 (0.1)
Country of residence	
Australia	4 (4.0)
Canada	2 (2.0)
Denmark	4 (4.0)
Ireland	7 (6.9)
Mexico	1 (1.0)
South Africa	1 (1.0)
United Kingdom	16 (15.8)
United States	58 (57.4)
Missing	8 (7.9)
Education	
Associate's degree	2 (2.0)
Bachelor's degree	28 (27.7)
Master's degree	47 (46.5)
Doctoral degree	12 (11.9)
Professional degree (JD, MD)	5 (5.0)
Missing	7 (6.9)
Training specific to delivering Arts in healthcare	
Yes	67 (66.3)
No	27 (26.7)
Missing	7 (6.9)

Among the survey respondents (n = 101), 38% identify as artists, 34% health professionals, 24% program coordinators, 4% researchers representing relatively equal distribution across roles. Geographically, 57% of respondents were US-based whilst 35% were non-US based including 16% from the United Kingdom, 7% from Ireland, 4% from Australia and Denmark, respectively, 2% from Canada, and less than 1% from Mexico and South Africa. As there were no forced responses to any survey item with the exception of consent and screening for inclusion, 8% of responses to country of residence were missing. See **Figure 1** for survey respondents' country of residence.

Regarding qualifications, a majority of those who responded held graduate or master's degrees (47%) whilst 30% held undergraduate degrees (bachelor's or associate's) and 17% held doctoral or professional degrees such as a medical degree (MD). Approximately 67% had received training specific to arts in health practice. Respondent characteristics are detailed in **Table 2**.

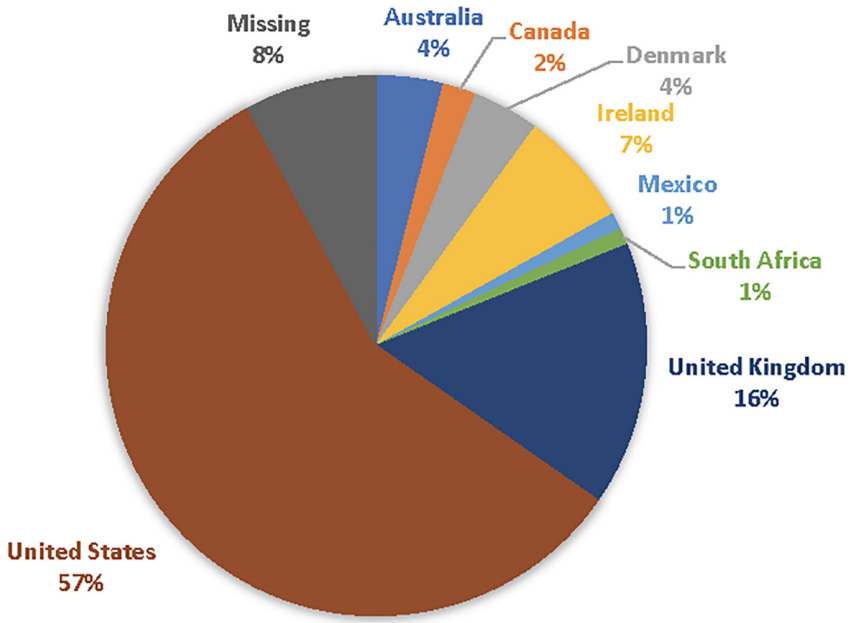

FIGURE 1 | Respondents' country of residence.

Practice Descriptors

Practice descriptors included reporting consistencies and variation in the range and scope of artists' practices including: (1) who delivers the arts; (2) where and with whom; (3) range of practices and observable changes related to practice.

Who delivers the arts included descriptors such as education, training specific to arts in health, current professional role, years of experience, professional collaboration in arts engagement, and the flow of patient referrals. *Where and with whom* included contexts and settings, patient populations, age range of participants, and whether arts engagement took place one-to-one or in a group setting. A range of approaches to practice – or *how* the arts are engaged – described the *range of practices* delivered by artists included the following items: art forms, average number and length of sessions, and whether and how arts engagement was documented. Respondents described public-facing art work created by participants such as performance or exhibition. *Observable changes* included any observable or participant-reported impacts such as change in symptoms, the environment, or participant-verbalized change, as reported by respondents. See **Table 3** below for practice descriptors indicating a range of approaches to practice and observable changes.

Who Delivers the Arts

Responses to current professional role yielded a description of multiple roles played by many survey respondents, such as both program coordinator and artist-in-residence. A wide range of professional collaborations were documented with a prevalence of collaborations occurring between artists and health professionals (44%) followed by artists of varying disciplines (40%) and artists of the same discipline (28%). Referrals were primarily provided by health professionals (43% of referrals) followed by patient self-referral (12%), program coordinator (10%), artist self-referral (9%), and a family member (6%).

Where and With Whom

Settings and participant or patient populations were described in the findings. Hospitals were the primary setting in which arts engagement was reported among respondents followed by hospice, community settings, outpatient healthcare settings, and finally, long-term care. Significant variation was noted between where respondents were employed and where artists were observed practicing. Respondents reported current employment ranging from hospitals/hospice (33%), arts organizations (16%), self-employment (10%), university settings (10%) and other (12%). That said, respondents reported that artists practiced and collaborate widely in all of the settings listed above and more.

Cancer and blood disorders were the most prevalent populations served with older adults with dementia reported second. Neurological conditions, frailty, cardiovascular disease and strokes, organ disease and chronic pain were also noted. A majority of respondents (75%) worked with adult populations ages 19 and older with 42% of those working with participants who were 65 years of age and older. See **Figure 2** for prevalence of participant populations.

Range of Practices

Art forms including visual art (18%), literary arts (1%), performing arts (26%) and multidisciplinary arts (48%) were reported and the distribution represented by respondents in the

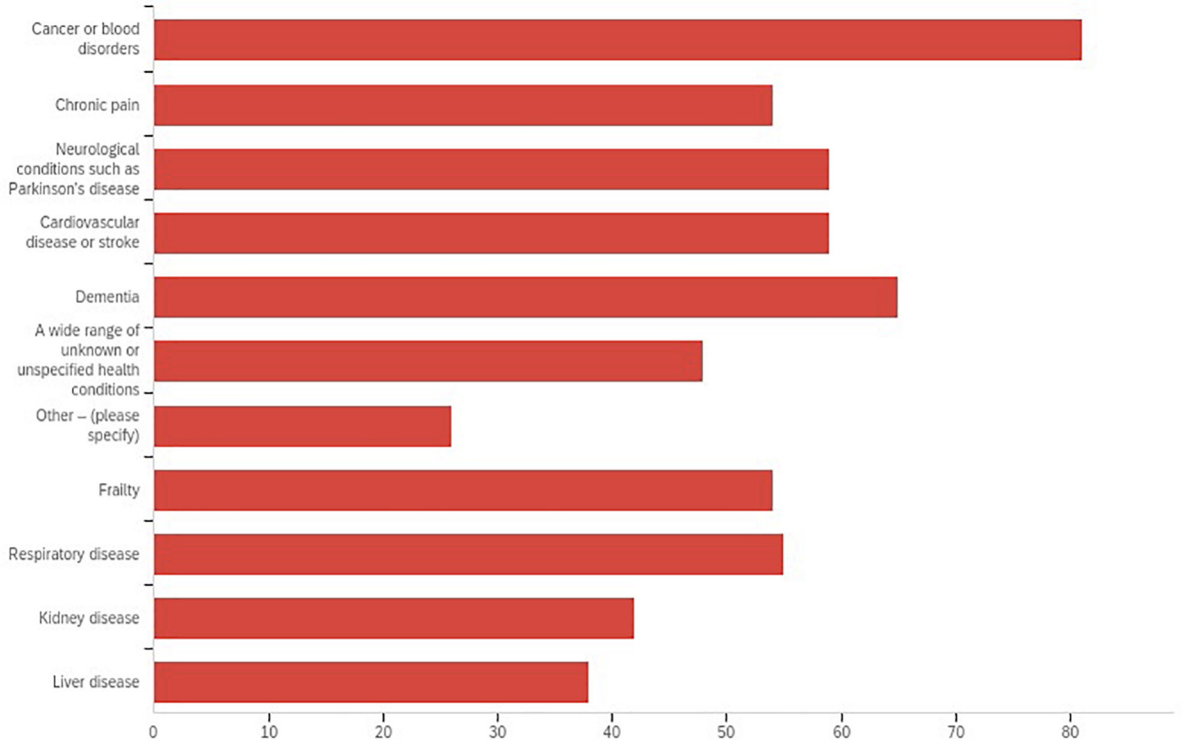

FIGURE 2 | Prevalence of participant populations served.

study. An average number and length of sessions, and whether and how arts engagement was documented were reported. Describing practice specifically, an average of 12 sessions were offered per week by a single artist with the majority of sessions lasting between 45 min and an hour. Among respondents, nearly half represented that multidisciplinary, or multiple, art forms (48%) such as music, dance, creative writing and/or visual art were available to patients or service users in their setting.

Professional structures were described including flow of communication, collaboration, documentation, and presentation of public-facing work. Wider variation was described in aims of documentation of arts engagement, however, only 11% of respondents did not document their practice at all, so practice was consistently documented for a range of professional purposes as exemplified by respondent quotations in **Table 4**. Also, a majority of respondents (60%) publicly exhibited or performed the art work that was created by patients, such as in art exhibition, a gallery space, or a public performance. Approaches to public-facing work such as exhibits, performances and readings of participant-created art work were consistently reported as requiring participant consent as well as discipline-specific artistic proficiencies and resources to execute well. See **Table 4** for examples featuring rich descriptions representing a range of contexts and mechanisms at play in artists' professional practices presenting public-facing work and documenting arts engagement. In this table, the sets of quotations are, respectively, categorized by text exemplifying *what* is occurring, *how* it occurs, and *to what end* under the themes of public-facing work and documentation of practice.

Observable Changes

Observable changes were reported numerically as this survey item was designed to select all that apply. These included participant's health or symptoms ($n = 68$), changes in participant's immediate environment ($n = 21$), verbalized by participants or group members ($n = 70$), and any other observable change ($n = 24$). Of the respondents, 68 wrote additional comments describing observable changes categorized in analysis as ranging from physical states (i.e., symptom reduction, relaxation, changes in breathing, blood pressure or heart rate as evidenced by monitors, reduced pain medication in one instance), emotional states [i.e., uplift, positive affect, reduced fear or anxiety, well-being scale (WEMWBS) measure improvements in well-being in one instance], mental states (i.e., increased focus, attention, orientation or alertness), and social states (i.e., increased communication, engagement, socialization).

THEMATIC ANALYSIS OF BENEFITS AND RISKS

A total of four open-ended items invited respondents to comment on their perceptions of practice including: (1) Briefly, what does the term *palliative care* mean to you in the context of your professional work?; (2) In your view, what are the primary

TABLE 3 | Practice descriptors.

Who delivers the arts	
Who delivers the arts with patients (select all that apply)	
Artists	77 (76.2)
Health professionals	48 (47.5)
Program coordinator or project lead	27 (26.7)
Volunteers	46 (45.5)
Other	5 (5.0)
Professional collaborations for arts delivery (select all that apply)	
Artists of same discipline	29 (28.7)
Artists of varying discipline	40 (39.6)
Artists and health professionals	44 (43.6)
Limited to no collaboration	13 (12.9)
Wide range of collaborations	47 (46.5)
Current place of employment (Categories)	
Arts organization	16 (15.8)
Hospital/Inpatient palliative care unit	33 (32.7)
University	10 (9.9)
Other: Community, hospice, long-term care/outpatient, self-employed, other	34 (33.7)
Missing	8 (7.9)
Years in current professional role, mean (SD), *n* = 92	11.26 (9.21)
Years professionally involved with arts in PC, mean (SD), *n* = 87	9.99 (8.46)
Range: (0–30)	
Where and with whom	
Settings of arts engagement (select all that apply)	
Community setting	60 (59.4)
Day hospice	18 (17.8)
Residential hospice	32 (31.7)
Hospital	70 (69.3)
Inpatient palliative care unit	41 (40.6)
In home care	25 (24.8)
Long-term care facility	36 (35.6)
Short-term rehab facility	18 (17.8)
Outpatient treatment center or clinic	41 (40.6)
Other	12 (11.9)
Common health conditions among patients (select all that apply)	
Cancer or blood disorders	74 (73.3)
Cardiovascular disease or stroke	55 (54.5)
Dementia	59 (58.4)
Frailty	50 (49.5)
Kidney disease	38 (37.6)
Liver disease	33 (32.7)
Respiratory disease	50 (49.5)
Neurological conditions	58 (57.4)
Chronic pain	51 (50.5)
A wide range of unknown or unspecified health conditions	51 (50.5)
Other	11 (10.9)
% of time spent with 1:1 or in groups, mean (SD)	
With individuals on a one-to-one basis, *n* = 92	37.51 (36.77)
With groups of individuals who have a similar health condition, *n* = 92	17.18 (23.98)
With groups of individuals with varying health conditions, *n* = 91	8.00 (18.50)
With groups of individuals who have health conditions and their family members, *n* = 91	14.51 (22.56)
With groups of individuals who have health conditions and health professionals, *n* = 90	6.80 (17.80)
Other, *n* = 94	3.43 (17.70)
% of patients in the following age ranges, mean (SD), *n* = 95	
0–3 years	1.87 (6.44)
4–12 years	5.50 (12.00)
13–18 years	5.22 (10.61)
19–35 years	7.77 (9.74)
36-64 years	25.87 (20.39)
65 years or older	41.49 (31.25)
Range of practices	
Art forms engaged with patients	
Literary arts	1 (1.0)
Performing arts	26 (25.7)
Visual arts	18 (17.8)
Multidisciplinary or multiple arts forms	48 (47.5)
Missing	8 (7.9)
Average # of arts sessions/wk in the past year, mean (SD), *n* = 89	11.89 (10.65)
Average length of arts session	
Under 15 min	3 (3.0)
15–30 min	13 (12.9)
30–45 min	13 (12.9)
45 min–1 h	23 (22.8)
More than 1 h	13 (12.9)
Varies by patient population or setting	26 (25.7)
Missing	10 (9.9)
Average length of arts session (in categories)	
0–30 min	16 (15.8)
30 min–1 h	36 (35.6)
More than an hour	13 (12.9)
Varies by patient population or setting	26 (25.7)
Missing	10 (9.9)
% of those who provide patient referrals to the arts, mean (SD)	
Artist, *n* = 94	8.57 (20.80)
Program coordinator, *n* = 95	9.91 (22.26)
Family members or loved ones, *n* = 94	6.27 (9.50)
Patient self-referral, *n* = 94	12.46 (19.03)
Health professional, *n* = 94	42.55 (37.04)
Artist documentation of arts sessions (select all that apply)	
In medical record	24 (23.8)
To share with their supervisors and/or colleagues	49 (48.5)
For professional purposes	57 (56.4)
For research and/or evaluation purposes	51 (50.5)
For other purposes	6 (5.9)
Artist do not formally document arts sessions	11 (10.9)
Artwork produced shared publicly	
Yes	61 (60.4)
No	26 (25.7)
Missing	14 (13.9)
Outcomes	
Changes observed during or immediately following an arts session (select all that apply)	
In patient health or symptoms	68 (67.3)
In patient's environment	21 (20.8)
Verbalized by patient or group	70 (69.3)
Other	24 (23.8)

benefits, if any, of engaging the arts with patients in palliative care?; (3) In your view, what are the primary risks, if any, of engaging the arts with patients in palliative care?; and (4) What else would you like to share about your professional experience engaging the arts in palliative care?

Themes and sub-themes were generated through thematic analysis of codes developed from the qualitative data (Braun and Clarke, 2006, 2014), which centered on perceived benefits and risks of arts engagement with those receiving palliative care and also considered respondents' definitions of the term *palliative care*. Respondents defined palliative care as "comfort care" and as care for "chronic conditions", "serious illness" and "care at end-of-life". Characteristics frequently used to describe palliative care include collaborative, holistic and centered around quality of life using terms such as "comfort care" with "psychosocial" and

TABLE 4 | Respondent quotations on public-facing work and documentation of practice*.

	What?	*How?*	*To what end?*
Public-facing, participant-created work	"Artwork is sometimes shared publicly, usually work by patients with whom we have cultivated a deep artistic relationship, and only with proper record of signed consent" "periodically" "infrequently" "sporadic byproduct" "rarely a driving force" "in the community"	"Consent is essential." "voluntary" "optional" "Patient directed" "patient led" "collaboratively created for installation" "community partnership"	"making special", "special occasion", "celebration" "exhibitions, performances, readings, presentations" "teaching seminars or annual conferences" "fundraisers or grant writing" "for print publication"
Documentation of practice	"Artists provide written report to share with team or supervisors." "Creative arts therapists documents in electronic health record."	"incident reporting" "personal reflection on arts practice . . . journaling"	"public relations, media, promotions, social media and fundraising" "funder's reports, annual reports" "academic research to publish" "program evaluation and tracking"

**The table above presents respondent quotations, which exemplify perceptions of what is occurring, how it occurs, and to what end with regard to artists' professional practices presenting public-facing, participant-created work and documenting arts engagement.*

"spiritual" emphasis. "Meaning making", "legacy", "purpose" and "support for family" were also indicated.

For the purposes of this article, three overarching themes were generated focused upon perceived benefits and risks of practice including: (1) enhanced well-being and quality of life of *both* participants and artists; (2) vulnerabilities and safety concerns for *both* participants and artists; and (3) perceived facilitators of and barriers to practice. Respondent quotations and associated themes related to benefits and risks were generated and provided in **Table 5**.

Perceptions of Benefits of Practice

Respondents identified benefits of the arts as addressing an overarching theme of quality of life followed by subthemes physical mental, emotional, and social well-being. Respondents described "meaning making", "social engagement", "symptom relief" and "personal growth and achievement" for participants. Respondents also described artistic growth and development, "rewarding" and "meaningful work", and social well-being through "professional collaboration" and participant, family and healthcare staff "gratitude" for their work.

Perceptions of Risks of Practice

With regard to perceived risks, respondents indicated a range of views on vulnerabilities with consideration for participants, artists themselves, and the systems within which artists practice, referenced as the "environment of care" in one instance. Vulnerabilities of participants included examples such as "emotional discomfort of participant", "emotional safety", and the term "vulnerability" specifically. Vulnerability of artists featured examples such as "burnout and vicarious or secondary trauma", "proper training of artists", value of "collaboration with mental health professionals" and of "navigating environment of care safely". Notably indicated, though with lesser frequency, was the importance of artists' assessment and observation skills in order to adeptly navigate the finding that arts engagement can both alleviate anxiety and introduce it. Another finding, however, was that emotions, and even distress, is normal, healthy human experience and as long as health professionals are on hand and working in collaboration, it is natural and even positive for some emotional expression to occur during arts engagement, specifically music.

General perceptions of practice were derived from the final open-ended question and yielded perceived barriers and facilitators as a primary theme. Sub-themes of perceived facilitators of practice included: person-centered and participant-led practice, communication and collaboration, and training and resources for artists. Sub-themes associated with perceived barriers of practice included: resources and funding, lack of support or development opportunities for artists and emotional safety for all involved.

DISCUSSION

The findings of the study described a prevalence of artists delivering the arts in oncology, and in hospital, hospice, and community settings. A majority of artists have both formal education (92% of artists who responded held a university degree) and additional training in arts in health (60% of artists reported arts in health training). Artists described consistency in practices of professional collaborations, flow of information such as documentation or receiving and making referrals, and public-facing patient-created art work. Variation in practice worth further exploration included adapting specific art forms across a wide range of participants and settings as well as a wide range of administrative structures such as purposes of documentation of practice, and referral sources including health professionals, family members, or family members' referral. Three overarching themes included: enhanced well-being and quality of life of *both* participants and artists; vulnerabilities and safety concerns for *both* participants and artists; and perceived facilitators of and barriers to practice.

TABLE 5 | Themes and sub-themes with respondent quotations.

Perceptions of benefits for *participants*	
Theme 1a: *Quality of life and well-being of participants due to arts engagement*	
Subtheme 1: Physical well-being	"...increased ability to sleep following dance sessions" "reduce symptom burden"
Subtheme 2: Mental well-being	"fuller self-expression" "[participant] comments suggesting a redefinition of self as 'creative"' "Arts ... support the person to continue living and discovering, even in the context of serious illness." "Art works created by service users are installed in their clinical environment thus making clinical spaces more welcoming and less fearful."
Subtheme 3: Emotional well-being	"expressing the inexpressible" and "You made my day!" "They report gratitude for the opportunity to take their mind to a more positive place." "expressions of gratitude" "giving families a tangible item is... priceless"
Subtheme 4: Social well-being	"increased levels of patients coming together in a circle to participate thus supporting increased levels of social interaction." "Healthcare professionals experience benefits when art is provided to patients with an end-stage illness. It can improve communication with patients."
Perceptions of benefits for *artists*	
Theme 1b: *Quality of life and well-being of artists due to arts practice located in palliative care*	
Subtheme 1: *Artistic growth and personal development*	"Artistically rigorous place to locate one's practice" "[arts in palliative care] gives great insight into the human condition and I am better equipped to work with more people at this stage of life."
Subtheme 2: *Meaningful employment*	"Satisfying and meaningful employment"; "a deep sense of meaning and purpose" "...rich, varied and valuable" "a very rewarding practice" "...can be life changing" "It's the most meaningful work I have ever done" "These practices are also hugely rewarding to the practitioner."
Subtheme 3: *Professional collaboration*	"it is important to have artists as part of the multidisciplinary team to work in collaboration with client, carers and other team members for a wholistic approach" "Kindness, gratefulness and open-heartedness of patients, overall" "People – patients, family members, and staff - are very grateful for our service."
Perceptions of risks for *participants*	
Theme 2a: *Vulnerabilities and safety issues for participants or patients*	
Subtheme 1: *Art form-specific considerations*	"resident with dementia sampled paintbrush in their mouth." "Art and music can provoke strong emotions, and the hospital is already a place for emotional landmines." "Assuming that all music is a universal good to all people all the time is a huge risk ... choice, control, music selection, tempo, key, register and volume control [are key]."
Subtheme 2: *Adapting for participant population*	"Arts can induce ... anxiety in patients that have limited experience, and if this is not ... managed correctly by the artist then patients may focus on their short comings" "Inappropriate choice of art form can cause distress to a patient." "overstimulation. That can cause great restlessness and sometimes anger." "Overexertion, bringing up too much emotion, frustration or difficulty with materials due to condition"
Subtheme 3: *Emotional safety*	"Emotional safety is a priority ..." "can bring up painful memories and provoke tears" "patient may feel a social obligation [to say yes] to the artist..." "ensuring that the arts facilitation will not cause a high level of emotional risk and distress for the patient or their families." "art can de-stabilize and disorganize someone versus stabilizing and fortifying their experience. Collaborate [with health professionals and] creative arts therapists to prevent distress..."
Perceptions of risks for *artists*	
Theme 2b: *Vulnerabilities and safety issues of artists*	
Subtheme 1: *Training and orientation to healthcare environment or population-specific needs*	"The closer to the bedside, the more training needed." "not training people to recognize signs of physical distress in patients is a risk" "adapting arts with symptom burden, disease progression, or disability in mind" "vital to be able to assess abilities of participants - physiological changes that prohibit capacities" "...due care must be taken with properly trained staff who understand the impact and power of arts in health."
Subtheme 2: *Awareness among, or collaboration with, healthcare staff*	"A risk is when staff assume that all the arts are good for everyone-No!" "...advocate strongly for collaboration between arts in health and creative arts therapists. There are specific roles that each can play." "there is some risk of distraction for healthcare providers..." "It is a priority that the artist is integrated into the palliative care process and is given support as required." "...in United Kingdom generally there is still a great need for education of healthcare professionals about the benefits of arts in health."
Subtheme 3: *Materials or discipline-specific considerations*	"sterilization of [visual art] materials" "follows infection control precautions with arts materials or props " "with dance, there is a risk of falling" "physical safety [of participants] if they are on pain meds or attending an outpatient class" "music is deeply connected with emotions..."
Subtheme 4: *Emotional safety*	"Facilitator burnout, vicarious trauma, and compassion fatigue." "...both incredibly hard and incredibly rewarding. The care and well-being of the artists that work directly with these patients should be a vital consideration for any organization overseeing arts in palliative care." "...over involvement, secondary traumatization or burnout because of the existential burden of the work or processes witnessed." "oversharing by patient or artist" "difficult communications"

(Continued)

TABLE 5 | (Continued)

General perceptions of practice	
Theme 3: ***Facilitators and barriers***	
Subtheme 1: *Perceived facilitators of practice*	"Person-centered, patient-led and patient-directed" "A **process-based** approach is so effective in achieving a meaningful act or a series of acts that gather meaning. A deeper understanding of **relational autonomy** supports our work. It keeps the person we are supporting at the fore." "Communication and collaboration with palliative care team, families and participants/patients themselves" "standardize aspects of practice" *(such as Practice Descriptors presented in* **Table 3***)* Training that emphasizes "communication", "collaboration", "safety measures such as materials use or fall prevention", risk assessment and observation skills, facilitation skills, adapting practice for accessibility
Subtheme 2: *Perceived barriers and limits to practice*	"We. Need. More. Funding. Simple." "...save healthcare costs in the long-run." "benefits dramatic, risks minimal, costs modest..." "Short-term nature of engagements due to project funds" "The arts have tremendous value in healthcare. This potential is currently largely untapped. Patients could be FAR happier, relaxed, self-aware with regular arts provision. This would reduce NHS bills into the bargain." "Potential lack of artist resources, support, supervision, training and development opportunities to address skills stated above" "Emotional expression and emotional safety outlined as a risk for both participants and artists above"

Significance of Examining "for Whom"

The findings have significance for participants, for artists, for arts in health as a discipline, and for culture, health and well-being sectors, broadly. Critical analysis of patterns of consistency and variation in international artists' practice advances efforts to recognize, value, and provide infrastructure in support of meaningful and effective interactions during arts engagement for artists and participants alike. Examination of professional perceptions of facilitators and barriers in arts in palliative care informs research and policy aimed at providing access to the arts.

Building upon existing literature, it is valuable to scope key professionals' perceptions of practice, namely those professionals who have direct experience delivering the arts in palliative care, where outcomes studies rightly focus on patients' perceptions and self-report (Fancourt and Finn, 2019). Secondly, it is also of use to reach internationally, across palliative and end-of-life care settings, and across patient populations in an effort to document the range and craft a continuum of artists' professional practices (Anderson et al., 2017; Fancourt and Finn, 2019). Finally, this study offers a survey instrument that may be adapted or built upon to describe artists' practices and to examine professional perceptions of arts engagement in specific healthcare settings or patient populations.

Key professionals who responded to the survey described benefits to well-being and quality of life for participants based on observation and underpinned by participant self-report. Risks were also reported, such as managing difficult emotions that arise during a session. Emotional expression of participants elicited by arts engagement was met with mixed findings among respondents. This finding is consistent with the literature in which processing emotional expression through arts engagement is frequently associated as an aim and within scope of practice of the creative arts therapies given their mental health education and training. Some respondents cautioned against eliciting emotional expression advocating for additional skills, training, supervision, and in a few instances, creative arts therapies' credentialing in order to navigate and process difficult emotion, which is consistent with existing recommendations by authors in music and art therapy (Moss, 2016; Van Lith and Spooner, 2018). Others described emotional expression as healthy, normal human experience, and even positive, when navigated in a skilled manner by the artist and re-directed toward the aim of art making. In some instances, an aim of the arts engagement was legacy making or public-facing performance or exhibition, for example. Anxiety was noted to be both correlated with art making, such as when a participant is not confident in their skill or lacks self-esteem, and to be alleviated by art making, such as when the challenge of the art activity is suited to the participant's skill level. Future research might continue to examine and explore the roles and limits of artists' practices with consideration for the vulnerabilities present for artists and participants alike in creative processes.

Significance of Examining "by Whom"

One consistent finding that bears further exploration is the multiple professional roles artists play across patient populations or healthcare settings. In some instances, artists reported working for more than one organization and/or in more than one role such as coordinating arts programs and facilitating arts engagement. This is highlighted by the contrast in findings in "current place of employment" and "settings in which arts engagement occurs", which points to a divergence of professional pathways for an artist seeking to work in palliative or end-of-life care and leads to questions of a central entry point for an artist seeking to gain employment. A range of respondents described their work in arts in health as merely one aspect of their professional identity regardless of their professional role. For example, some respondents stated that they manage multiple roles and income streams including creating and selling their own artwork professionally whilst also working in other socially-engaged forms of arts practices such as arts education, arts and disability or arts in prison settings.

While artists reported working widely across contexts (i.e., in multiple settings), it was rare that artists were engaged in informing or conducting research, as only four respondents

reported doing so in the survey. It may be of use to consider ways to address artists' professional risks and to support artists' collective well-being by deepening understanding of the economic, intellectual and cultural components comprising professional work in arts in health broadly, and in arts in palliative care specifically. Artist-led research initiatives are recommended in order to explore these vital elements of practice to ensure workforce well-being and resilience. The findings suggest there is value in considering what skills, structures, resources, and training may best equip artists to promote practices that increase benefits and ameliorate risks for participants, artists, and the wider healthcare and arts organizations and sectors, within which they operate.

An additional finding of significance was the vulnerabilities artists face while working in palliative care. Perceived facilitators and barriers might be more directly explored in future study to better understand and inform these aspects of practice and implement policy to address them. Further, it would be valuable to investigate variables impacting artists such as: job/economic security, training/professional pathways, and organizational structures and resources as relates with workforce resilience.

Significance of Key Professionals' Perceptions

Rich description of perceptions of benefits, risks, and overall practice were provided. The volume of written response in open-text items indicated investment in the subject matter by key professionals including artists, health professionals and program coordinators. As demonstrated in the three primary themes, six sub-themes and corresponding respondent quotations in **Table 5**, participant well-being was impacted in myriad ways and risks outlined that may be ameliorated with specific recommendations made by respondents. Perceived risks in particular indicated future directions for research to inform practice such as training in arts in palliative and end-of-life care, awareness for healthcare staff, art form-specific considerations including adaptations for specific conditions and patient populations and finally, taking steps to ensure the well-being of both the participants and the artists delivering arts engagement.

Implications

This is the first international survey effort to describe, and further examine, the range and scope of literary, visual, performing and multidisciplinary arts practices delivered by artists with patients in palliative or end-of-life care. The introduction of a survey instrument is a contribution to further conceptualizing mechanisms of practice in an effort to advance the evidence base. Arts in health professional membership organizations were receptive to supporting recruitment for the study, which enhanced the response rate and demonstrated interest in the study topic. As the field of arts in health is evolving, expanding, and professionalizing, it was difficult to ascertain definitively the number of artists working in the clinical subspeciality of palliative care. Given this challenge, the number of respondents (N = 101) was significant in itself. Respondents represented international reach, including the four continents of North America, South America, Europe and Africa and thirteen individual nations, even in those instances in which only one response was received from a region such as South Africa, Mexico, or Spain.

Limitations

Several factors impact the generalizability of findings in the study. The survey was distributed *via* professional membership organizations and networks and therefore had limited reach among those who were not affiliated with formal networks. Further, it was conducted in the English language and therefore limits respondents who do not speak English, as there was not funding to translate the survey for wider reach. These study limitations impacted demographic representation of respondents. More respondents represented the United States and the United Kingdom than other geographical locations represented including Ireland, Australia, Canada, Europe, Mexico, and South Africa. The overall response rate to the survey was not calculated as there was no available data that documented the number of artists working worldwide in palliative and end-of-life care. In the future, it would be beneficial to consider whether forcing responses or amending the tool to fewer items might yield additional data. Finally, while it is beyond the scope of the present study, it is vital to consider the valuable roles of volunteers play in delivering the arts in palliative and end-of-life care settings and is worthwhile to articulate and examine these contributions in their own light.

CONCLUSION

Findings demonstrated a wide range of artists' practices in palliative and end-of-life care, featuring both consistencies in international practice as well as variation. Education and training, key steps in professional preparation, for example, vary widely raising question as to professional pathways for artists. This study highlights a need to further conceptualize and potentially standardize aspects of practice in order to increase uptake of the arts in palliative care and support safe, meaningful and effective implementation for participants and artists alike. Consideration of safe and effective practice for both participants, and equally artists', well-being is paramount. A primary goal of the survey was to describe key professionals' perceptions of the range and scope of artists' practices in the delivery of visual, performing, literary, or multidisciplinary arts with individuals living with life-limiting illness and/or receiving palliative or end-of-life care.

As previously established, evidence supports engaging the arts for health and well-being, pointing to the unique benefits of the arts in palliative care including non-pharmacological symptom management, quality of life and meaning making. An ongoing and international effort to deepen understanding of practice may contribute to an uptake of the arts delivered by artists in palliative and end-of-life care. As practice continues to evolve, clear understanding of aims, approaches, benefits and limits of arts engagement ultimately enhances patients' experiences of the arts whilst advancing evidenced links between the arts and well-being.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Florida Institutional Review Board (IRB-02) and Ulster University INHR filter committee. All survey respondents provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JBL conducted data collection, analysis, and manuscript preparation. SM and LF provided methodological support, manuscript development, and critical appraisal of manuscript. All authors have given the final approval of the manuscript to be submitted for publication.

FUNDING

Open access publication fees are funded by the University of Florida.

ACKNOWLEDGMENTS

The authors wish to thank Jasmine Mack (J.M.) for consultation on instrument design and statistical analysis. The authors also wish to acknowledge Nicole Morgan for research assistance and University of Florida Center for Arts in Medicine director Jill Sonke and undergraduate research lab team members, Alyssa Walters, Sarah Braceras, Giselle Perez, Jennifer Ly, and Lindsay Gassman for research support.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

REVIEW
published: 14 December 2021
doi: 10.3389/fpsyg.2021.742032

Links Between Arts and Health, Examples From Quantitative Intervention Evaluations

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The author presents eight of his own group's studies. They have been published from early 1980s until 2016. Each study will be placed in its scientific context and discussed in relation to possible progress in arts and health research. In these examples, statistical methods with longitudinal designs and mostly control groups have been used. Some of them are randomized controlled trials. Physiological and endocrinological variables have been assessed in some of these studies in efforts to increase our understanding of how music experiences and other kinds of arts experiences interact with bodily reactions of relevance for health development. Although some of the studies have suffered from low statistical power and other methodological weaknesses, they show that it is possible to do statistical evaluations of arts interventions aiming at improved health.

Keywords: visual arts, music, poetry, leadership, elderly, regenerative hormones, choir singing, school

OPEN ACCESS

Edited by:
Stephen Clift,
Canterbury Christ Church University,
United Kingdom

Reviewed by:
Elena Alessandri,
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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *15 July 2021*
Accepted: *16 November 2021*
Published: *14 December 2021*

Citation:
Theorell T (2021) Links Between Arts and Health, Examples From Quantitative Intervention Evaluations. Front. Psychol. 12:742032. doi: 10.3389/fpsyg.2021.742032

INTRODUCTION

The potential of arts intervention both in treatments and in public health work is the main theme of this whole special collection on arts and health. This presentation is focused on examples of research from one group of researchers associated with the National Institute for Psychosocial Factors and Health as well as the Department of Public Health at the Karolinska Institute in Stockholm, Sweden. As the leader of the group, I had a background working as a physician in cardiology, general practice, and social medicine. The studies described here took place during three decades, starting from the early 1980s. This reports a summary presentation of eight studies. The aim is to show how the studies were framed and how the scientific background influenced the design and execution of the studies. The examples illustrate how contemporary developments in basic science have influenced the choice of assessments in studies of health effects of arts interventions. They also show that the field has had poor financial support in Sweden. This has resulted in small-scale studies. Since interest in the research area across the Nordic region is increasing, this is likely to change.

DESCRIPTION OF THE STUDIES

Tables 1–3 show an overview of the eight evaluation studies.

Arts Activation in Home for Elderly

The first study (Arnetz et al., 1983) was launched during a period in science when techniques for the assessment of endocrine changes were developed. Endocrine pathways had previously been introduced in psychosomatic medicine and stress research (Selye, 1950; von Euler and Lishajko, 1961; Levi, 1965; Frankenhaeuser et al., 1968; Dantzer et al., 1980), but more and more sensitive assessment methodologies were developed (see Dantzer and Kelley, 1989), and it therefore became possible to detect small changes due to subtle psychological reactions. Of particular interest for research in the field of possible relationships between cultural activity and health was that John Mason (1968) had introduced the positive stress-counterbalancing pathway which can be summarized as the hypothalamo-pituitary-gonadal (HPG) axis. According to Mason, the hypothalamo-pituitary-adrenocortical (HPA) axismobilizes energy during challenging situations and is balanced by the restorative and regenerative function of the HPG axis active during rest and joyful stimulation. During such periods hormones which belong to this group, such as sex hormones and their precursors (DeHydro-Epi-Androsterone, DHEA, and DeHydro-Epi-Androsterone sulfate, DHEA-s, in both men and women), stimulate the replacement of worn-out cells and repair damaged cells. The excretion of these hormones can be assessed in blood, urine, and saliva.

In a home for elderly people, one unit (floor in the building) was assigned to be intervention and another one to be the control group. The experimental period lasted for 6 months, and assessments were made before start, after 3 months, and at the end of the intervention period. Standardized assessments of emotional states, social activity, height and weight, blood pressure and morning blood concentration of HbA1C (reflecting accumulated changes in blood sugar during a couple of weeks) as well as hormones which mirror regenerative (anabolic, HPG) activity and energy mobilization, respectively, were made.

TABLE 1 | Study characteristics.

Study name	Year and authors	Design	Sample sizes
Arts activation for elderly	Arnetz et al., 1983	Intervention and comparable contr	Matched age, sex, 30/30
Visual arts for elderly women	(Wikström et al., 1993)	Random allocation to intervention/talk	Matched pairs 20/20
Choir singing and IBS	Grape et al., 2009, 2010	Random allocation to choir/talk	No prev choir 28/27->13/14
Dance therapy for fibromyalgia	Bojner Horwitz et al., 2003	Random allocation to dance/usual care	20(oversampl) vs. 16
Multiple arts for burnout	Grape Viding et al., 2015	Random allocation to arts/ usual care	36(oversampl) vs. 12
Weekly joy music against school stress	Lindblad et al., 2007	Comparable groups music/ computer/usual	16/18/64 ->13/15718
Art psychotherapy in psychosomatics	Theorell et al., 2021	Referred patients with long-term illness	24 patients with full partic.
Art-based leadership training	Romanowska et al., 2011, 2016	Random allocation of matched managers with subordinates	18/19 manag. 41/58 subord. 55/66% partic.

TABLE 2 | Interventions.

Study name	Intervention description
Arts activation for elderly	Exploration of previous individual arts activities and formation of active culture groups (interv) or usual routine (contr.) 6 months
Visual arts for elderly women	Discussion based on inspection of fine art (contr) or daily events (contr.) 4 months plus follow-up 4 months
Choir singing and IBS	Choir singing once/week (interv) or lecture plus discussion 1/w (contr.) for 1 year
Dance therapy for fibromyalgia	Weekly dance therapy (interv) for 6 months or usual care (cont) for 6 months with 8 months follow-up
Multiple arts for burnout	Every week rotating art intervention twice/week (interv) for 3 months or usual care (cont) for 3 months plus 8 months follow-up
Weekly joy music against school stress	One hour extra social music/week (interv) or extra computer learning (contr 1) or usual curriculum (contr 2) for one school year
Art psychotherapy in psychosomatics	Long-term psychosomatic patients referred for art psychotherapy for up to 2 years
Art-based leadership training	Poems and music with group discussions (interv) vs. lectures without arts (contr)

The staff examined every tenant's previous life experiences of cultural activities and using this information, interest groups were created based on those tenants that turned out to have the same interests. This exploration led to the formation of several cultural groups: one for botany, one for visual arts, one for history, one for instrumental music and one for song. The visual arts group jointly constructed a piece of art, and the history group studied the history of the place during the winter and then made walks in historically interesting surroundings.

There were 30 participants in each group. The two selected units had 60 tenants each, but the selection of participants was made with the goal of creating two strictly comparable samples with participants who would be able to finish the study. The selection process was made in cooperation with the staff. Non-participation was low, and the "intention to treat" principle was used which means that non-active subjects were included in the evaluation. The samples were matched for age group, sex, and physical and psychological disability.

The results (Arnetz et al., 1983; Arnetz and Theorell, 1983) indicated favorable changes in social activities in the intervention compared to the control group from start to 6 months. This increase in improved social activity was paralleled by an increase

TABLE 3 | Observations and results.

Study name	Observation periods	Significant results
Arts activation for elderly	Pre and post 3 months and 6 months of intervention	Improved emotions, social activity and physiology in intervention group
Visual arts for elderly women	Pre and post interv (4 months) and follow-up (+4 months)	Improved emotions, social activity, and blood pressure in intervention group
Choir singing and IBS	Pre and post 6, 9, and 12 months of interventions	First half-year marked testosterone increase, first year improved fibrinogen in choir group
Dance therapy for fibromyalgia	Pre and post interv (6 months) and follow-up (+8 months)	Improved mobility, less pain and more energy after dance therapy
Multiple arts for burnout	Pre and post interv (3 months) and follow-up (+3 months)	Improvement of alexithymia and burnout scores in interv group until follow-up
Weekly joy music against school stress	Pre (August), mid school year (December) and end (June)	Decrease in mid-day saliva cortisol in music gr but not in other groups
Art psychotherapy in psychosomatics	Every 4–6 months during 2-year weekly therapy	Decreased anxiety, depression after 1 year, increased energy, and uric acid post 6 months
Art-based leadership training	Pre and post interv (12 months) and follow-up (+6 months)	After 18 months improved mental health, DHEA-s in intervention subordinates

in regenerative hormone activity (sex hormones and DHEA) and in decreased concentration of HbA1C, which is likely to mirror decreased energy mobilization or "stress."

This arts activation of elderly accordingly showed promising results which indicated that it may be possible to influence life for institutionalized elderly by means of arts activities resulting in improved hormonal balance. However, several parameters were assessed, and the samples were relatively small. This might have resulted in randomly "significant" findings, but the all-over pattern clearly pointed in a positive direction. It could be argued that a strict individual randomization would have been preferable. However, most of the arts activities performed were collective in nature and changes in the whole ward could be one of the possible beneficial results of the intervention. Thus, the ideal study should have included several wards and much larger samples in a cluster randomized trial.

With the design employed it is impossible to know whether the crucial element is the art stimulation itself or not. It could be that any intervention aiming at increased social activity could have induced similar results. What the results do show is that the package that was used has had clear positive effects. One interpretation is that arts activities could be potent stimuli for togetherness.

Similar studies have not been published but our group has recently used a daily self-selected music listening program for demented home-cared subjects together with their caring relative. This was evaluated by means of repeated saliva assessments of cortisol (representing HPA) and DHEA-s (representing HPG) every day during a 2-month period. The findings showed that one-fourth of the patient-relative couples had decreasing cortisol levels and improved balance between HPA and HPG during the intervention period. For the relatives, a significantly improved circadian pattern was observed (Theorell et al., 2021) on the whole group level. Results from a control group are necessary for the interpretation of results and results from such a group are forthcoming.

After completing this first study the decision was made to take the findings to new studies of elderly to further explore the potential role that more specific cultural activities could play for the health of elderly.

Visual Arts Stimulation for Elderly Women

The framework of this study (Wikström et al., 1993) was the same as in the first study, a home for elderly where each tenant lives in an apartment of his/her own but joint main meals were organized once a day. Forty-six women living alone with age at least 70 were asked to participate. The potential participants were matched pairwise so that within each pair the subjects were comparable in terms of handicap and age. Within each pair a randomization was performed, with allocation either to art intervention or control condition. Thus, the study differed from the previous one since the formation of groups was based upon individual randomization. The intervention was much less "social" and more limited – looking at pictures of visual fine arts and discussing thoughts evoked by these.

Twenty participants in each groups completed the study with measurements before start, again after 4 months (when the intervention had been finished), and were finally followed up 4 months later. The intervention took place once every week during the four intervention months and lasted for 1 h on each occasion. Attrition was not a problem. The experimental leader (Wikström) carried with her a small projector by means of which she could show pictures of fine art (by artists, such as van Gogh, Monet, and Manet, and Swedish artists, such as Zorn, Larsson, and Sandberg) with defined themes, such as "playing children," "flowers," and "women." In each session, pictures illustrating one of these themes were shown. After each picture, there was a discussion regarding feelings and thoughts evoked by the picture. In the control group the experimental leader spent the same amount of time once a week for 4 months discussing societal events that had occurred during the past days.

Statistically significant findings (two-way interactions) in this study comparing the development in the two groups showed that the women in the arts group, but not in the control group, developed more joyful and less depressed feelings, decreased systolic blood pressure, and an improved ability to interpret visual presentations according to a standardized test. An interesting observation was that the consumption of laxatives decreased in the art group but remained constant in the control group. Improvements in the intervention group stayed significant after the four-month follow-up after the end of the interventions.

This study indicates that repeated conversations based on thoughts evoked by fine arts stimulation may have stronger effects on well-being among elderly institutionalized women than conversation about daily events reported in newspapers. The finding contributes to the question whether arts interventions add anything that cannot be achieved by conversations or social contact in general.

A critique of the study design is that the experimenter performed the conversations in both groups, and hence, bias cannot be ruled out. There was awareness of this methodological problem, and the experimenter accordingly made efforts to make both interventions interesting and intellectually rewarding for the participants. Another critique is that many statistical comparisons were performed on two relatively small groups with possible random significance. However, the findings follow a meaningful pattern. No strictly comparable study has been published elsewhere, but art therapy (including both active and passive components) has been used for instance in breast cancer rehabilitation therapy, and it has been shown in a randomized controlled study to improve coping resources in cancer patients (Öster et al., 2006).

After having devoted most of our energy in the first studies to elderly, we turned to younger subjects in further work and focused on a specific group with a disorder that is according to most researchers partly psychosomatic (Hausteiner-Wiehle and Henningsen, 2014). The underlying idea is that psychosomatic patients represent a sensitive group who could be hypothesized to display more obvious effects of arts intervention than others. In this case, we also used a more specific arts intervention, namely choir singing.

Choir Singing and Irritable Bowel Syndrome

In population studies, irritable bowel syndrome (IBS) has been shown to be a problem for up to 10% of the normal adult population. Among etiological factors diet, circadian meal rhythmicity, and psychological stress have been mentioned. It has been shown (Jonsson and Hellström, 2000) that the blood concentration of a hormone, motilin, that regulates peristalsis in the gut, is disturbed by provocation of thoughts about stressful life experiences.

Given the evidence that singing can relieve stress (Clift et al., 2008, 2009), this study explored the idea that choir singing could be beneficial for IBS patients. Patients were recruited *via* advertisements in daily newspapers and from the union for patients with gastrointestinal disorders.

After screening, 28 subjects were randomly allocated to the choir and 27 to the control group (Grape et al., 2009, 2010). The choir participants met for choir singing once a week during a school year (autumn and spring semester) while the participants in the control group met for lectures about IBS with approximately the same frequency during the same period. Choice of music for the choir rehearsals was adapted to the fact that most participants had no experience of choir singing. The choir year ended in a performance for the control group. In the control group, the participants listened to short lectures about various recommendations for IBS patients and had group discussions regarding what had been said ("information group"). Questionnaires and blood samples were collected before as well as after 6, 9, and 12 months in both groups. On the same days, saliva samples were collected from each subject during waking hours of the day on six occasions from awakening to bedtime. After 12 months, 13 subjects remained in the intervention and 14 subjects in the control group (46 and 52%, respectively). Thus, although there was approximately 50% attrition altogether, the drop-out frequency was comparable in the two groups. An intervention of this intensity (once a week) over a whole year in a community intervention is likely to be associated with high attrition.

The one-year findings showed borderline significant findings ($p = 0.08$) for motilin – the hormone regulating gut activity mentioned above – and self-reported IBS pain according to scores in the standardized questionnaire ($p = 0.08$). There was a significant interaction, however, in two-way analysis of variance ($p = 0.047$) for plasma concentration of fibrinogen which increased in the control group but remained stable in the choir group. An interpretation is that the participation in choir singing may have prevented an adverse increase in inflammatory activity observed in the control group. Fibrinogen mirrors pro-inflammatory activity. It also has an important role in coagulation – increasing fibrinogen is associated with increasing tendency to clot formation and increased velocity of atherosclerosis. All these findings were in the direction of a more beneficial development during the study year in the choir group. From start to 6 months, there was a significant rise in saliva testosterone concentration in the choir group (+70%) but no such change in the information group (−20%) with a significant group-time interaction ($p = 0.01$). This testosterone difference between the groups only lasted during the first half-year and was not maintained until the end of the year. Testosterone stimulates regeneration (see above, HPG axis) in all cell systems in the body (see Theorell, 2016). In normal physiological regulation, both in men and in women, an increase in saliva testosterone corresponds to improved health and increased regeneration of worn-out tissues. This serves as protection against adverse effects of stress. We could only speculate about reasons for the relatively short duration of this positive hormonal effect.

Most of the findings were only tentative but one interpretation is that choir singing may induce more beneficial physiological processes in this group of patients than conversations/lectures without singing or other components of arts.

Dance Therapy for Fibromyalgia Patients

Another specific art form is dancing. It is frequently argued that dance and music are closely related arts activities and that it would be logical to study possible effects of dance therapy in psychosomatic conditions. The decision was to focus on another severe psychosomatic condition, fibromyalgia, which was a relatively common diagnosis in Sweden at the time (Lindell et al., 2000). Fibromyalgia patients suffer from extreme fatigue and muscle pain.

The fibromyalgia dance study (Bojner Horwitz et al., 2003) involved patients who were recruited from rheumatology specialists in Stockholm. Thirty-six patients with an established diagnosis were randomly allocated either to treatment with dance therapy once a week or to "usual therapy" for 6 months. There was deliberate oversampling for the intervention group (20 versus 16 subjects). Assessments were made before the start of dance therapy, immediately after the therapy period 6 months later, and then again after a follow-up period of 8 months. Attrition was not a problem.

Standardized ratings of pain, mobility, and energy were made as well as morning sampling of saliva and blood for the assessment of stress-related hormones. Video recordings of standard movements performed by the patients were made in conjunction with the assessments (Bojner Horwitz et al., 2004).

The results 14 months after start showed statistically significantly improved self-ratings of pain, energy, and mobility in the dance group but not in the control group. Interestingly, when patients had inspected their own video recordings of standard movements on the same occasions, they rated their own improvements as more convincing. No significant changes were found for the stress hormone measures.

Research on possible relationships between dance and health is growing. Recently, research (Bojner Horwitz et al., 2015) has shown that the development of dancing skill is associated with greater ability to communicate feelings. A randomized controlled intervention trial showed that adolescent girls with mild psychosomatic symptoms showed improved subjective health from weekly free dance activity but also that the intervention must be sustained for long periods (Duberg et al., 2013). Thus, the relevance of dance therapy has been strengthened by later research.

The next step in our efforts to throw light on possible effects of arts activities on health was to apply a multi-cultural approach in our intervention. Our focus was on exhaustion syndrome (burnout) which had at the time replaced fibromyalgia as the most frequently diagnosed severe long-lasting condition resulting in work absence (Höglund et al., 2020). Exhaustion syndrome is characterized as a stress-related condition with chronic fatigue. Cognitive difficulties are common.

Palette Study – Multiple Arts for Women With Burnout Syndrome

The Palette study aimed to evaluate the effect of exposure to multiple art forms for patients with burnout syndrome (Grape Viding et al., 2015). Neurobiological research had shown that different areas of the brain are stimulated by visual art and by music but also that the intensity of the reaction in both types of areas was stronger when visual and musical stimulation were presented simultaneously (Baumgartner et al., 2006). This was an important observation because it showed that concomitant exposure to several kinds of arts activities might have stronger effects than interventions with only one kind of arts activity. Later research has shown (Lennartsson et al., 2017) that expertise in music as well as in other kinds of fine arts (writing, visual arts, and theater) is associated with good ability to handle emotions and that concomitant competence in several kinds of arts is associated with even better emotional ability.

The Palette study was based on the researcher group's assumption that alexithymia is an important factor in the burnout syndrome (Grape Viding et al., 2015). Alexithymia is lack of ability to differentiate, verbalize, and communicate feelings. When subjects lack these abilities, they have difficulties to handle stressful situations and this may result in sleep problems and long-lasting lack of regeneration, which induces a state of increased psychological and somatic vulnerability. In the intervention group, the participants had a rotating exposure to many kinds of cultural activity (two occasions for each participant of interactive theater, movie, vocal improvisation and drawing, dance, mindfulness training, and musical show) once a week over a period of 3 months. This differs from the arts activation for elderly people described above since the activities in that study were self-selected on a group basis and the participants stayed in the group throughout the intervention period. These two strategies could be described as "rotating" and "non-rotating" interventions. In the control group in the Palette study, the participants had health care center routine care. Both programs were housed in the patients´ own health care centers. Attrition was not a problem.

After the diagnosis of burnout syndrome had been established, 55 female patients were recruited in the three health care centers. Seven were excluded because they had serious depression. The remaining 48 patients were randomly allocated to the intervention and control group, respectively, with deliberate oversampling to the intervention group, 36 in the intervention and 12 in the control group. Using standardized questionnaires, assessments were made of degree of exhaustion syndrome and alexithymia before start, at the end of the intervention period, and finally after the additional 3 months of follow-up. The results showed a statistically significant improvement both in alexithymia and exhaustion syndrome scores in the intervention group but not in the control group. This difference was sustained in the follow-up assessments.

The results supported the hypothesis that 3 months of "rotating" multi-cultural intervention would be associated with decreased emotional exhaustion and alexithymia. It was positive that the attrition was small. Again, in this kind of intervention it is impossible to know what components of the intervention are effective. What can be concluded is that a "package" of cultural experiences may have beneficial effects.

Joyful Music for Pupils and Lowered Stress Levels in the Classroom

This study (Lindblad et al., 2007) was on the ancient idea that music has the ability of increasing "togetherness" if it is "distributed" in a constructive way. The importance of this was confirmed by Spychiger (1995) who performed a large music intervention study of 52 classes in Switzerland representing different ages in the Swiss compulsory school system. Half of the classes were randomly assigned an extra hour of (social) music lessons per week while the other half followed the "regular curriculum" group. The intervention and the evaluation

assessments in both groups lasted for 3 years. The major finding was that the social skills in the pupils improved much more over the study period in the music intervention group than in the other group. Similar results were found several years later in a Finnish study of 735 school children aged 9–12. The results showed that the school environment improved for these children and that such an improvement was not observed in a control population (Eerola and Eerola, 2014).

In our own study (Lindblad et al., 2007), a music teacher who had developed a technique for using classroom music as a play tool, aiming at improved cohesiveness among the pupils, distributed the intervention program which took place in the classroom for an hour once every week during a school year. The informal title of the project was: "By doing fun music together we discover one another." Pupils in the 5th and 6th school year were randomly assigned to three groups, the music intervention group, an "extra computer training" group and a "regular curriculum" group. There were 17 fully participating subjects in each group. Attrition was not a problem in the music intervention and the extra computer control group but much larger in the regular curriculum control group – in which subjects only responded to questionnaires and delivered saliva samples. Assessments of psychosocial functions and cortisol concentration in saliva samples were made on participants at start of Fall, before Christmas and finally in June before the Summer vacation. The saliva samples were collected at awakening, at mid-day, and finally at bedtime (Lindblad et al., 2007). The results showed that in saliva the mid-day cortisol levels decreased significantly in the music group during the study year (from start to end of year) but not in the other groups. The interpretation is that the atmosphere slowly calmed down during the school year in the music group. The psychosocial assessments, however, did not show any significant change. The study had relatively low statistical power. As with the other studies described here, the classroom-study needs replication.

Art Psychotherapy for Psychosomatic Patients

There is a growing scientific literature indicating that various forms of therapy utilizing experiences of arts (music therapy, visual arts therapy, dance therapy, and psychodrama) can be of benefit for patients with long-lasting stress-related conditions, such as sleep disorder (Feng et al., 2018), chronic pain (Lee, 2016), and depression (Tang et al., 2020). In the present study, patients with long-lasting psychosomatic conditions resulting in partial or total loss of working capacity for at least 1 year (Theorell et al., 1998) were treated in the "art psychotherapy" program. All the patients had chronic pain conditions but most of them also other illnesses, such as high blood pressure and gastrointestinal disorders. The patients were referred to the program from a rehabilitation center. They were informed that the expected duration of art psychotherapy treatment was 2 years. After careful psychosomatic examination each patient was allocated to treatments once a week for 2 years in either visual art therapy, music therapy, dance therapy or psychodrama. The kind of art therapy judged to be best for the patient was selected by the total group of therapists (psychologist, physician, visual art therapist, music therapist, dance therapist, and psychodrama expert). The therapists had monthly follow-up meetings in a collaborative effort to use mutual competence. For instance, dramatic memories during a music therapy session may have been discussed during such a therapy meeting. The music therapist may have been advised to stimulate the patient to draw or paint this memory, and then, the resulting picture was interpreted by the therapist group on a subsequent meeting.

Referring to the terminology presented above regarding multi-arts interventions, this program was "non-rotating," but occasionally input from the other forms of therapy was used.

Three-fourths of those who started stayed in treatment as long as the therapist considered it optimal. Twenty-four participants (22 women and two men) had their treatment started on average 2 years (range 13–42 months) before the end of the treatment period and participated in the evaluations. At 4–6-month intervals, blood samples were drawn for the assessment of serum uric acid (a proxy measure for energy level, the higher the uric acid level the higher the energy level) and the regenerative hormone DHEA-s. On every assessment occasion, an exploration of psychological state (anxiety and depression) was also performed by means of self-administered standardized questionnaires.

The results indicated that the first year of treatment was characterized by emotional turmoil paralleled by increased energy level (starting from sub-normal level) reflected in temporary significant elevation of serum uric acid. The regenerative hormone DHEA-s had low concentration in the group and did not improve during the study period. Significant improvement was observed in anxiety and depression after 1 year of treatment. A tendency toward decreased levels of somatic symptoms in general was observed after 2 years of treatment. One-fourth of the patients increased their working activity.

A major weakness in this study was the absence of a control group. It should be pointed out, however, that the chronic conditions that the patients were suffering from had lasted for at least a year and that spontaneous recovery could not be expected. The improvements were slow, and evidence of increased regenerative hormone activity was not found. No similar studies have been published which could confirm or reject these results.

The final report describes a different target group, It was explored whether it would be possible to establish health effects in a "third part." A framework for improvement of social and emotional manager skills was established. It was examined whether a combined arts intervention (music and poetry) triggering ethical group discussions could be superior in improving social skills among participating managers in comparison with an established cognitively framed management course. Even more importantly, it was explored whether this might lead to improved health among employees. An RCT design was used.

Art-Based Leadership Training

No scientific evaluations have been published on the potential for beneficial personnel health effects of efforts to influence managers in the direction of increased emotional engagement in their staff by means of arts intervention (Romanowska et al., 2011, 2016). An arts intervention program for this purpose was created. Carefully selected poems dealing with ethically provoking questions with relevance for managers were read professionally to the whole intervention group of managers. The messages were accompanied by specific recorded music. After the performances, there were group discussions regarding the contents. Participating managers met for these sessions once a month for 9 months. They also wrote diaries between the meetings and their diary thoughts were used in discussions.

The control intervention program consisted of a widely accepted manager competence training program with the same amount of time engagement, lectures with cognitive contents and group discussions but no artistic components, also once a month over 9 months.

Fifty managers were randomly allocated to either arts or control program. Assessments were made before the start, at 1 year, and finally 18 months later. For each participating manager three subordinates were selected for parallel assessments in both groups. Attrition was a problem due to the long study period since both managers and subordinates in some cases moved to other workplaces, and when a manager moved, data from the corresponding subordinates could not be used. Only one manager in the intervention program and two managers in the control program were lost due to resistance against the respective program, however. Participants in the final analyses on all three occasions were around 20 in both groups for the managers and 35 and 55, respectively, for the subordinates. Standardized questionnaires for the assessment of psychosocial variables and analyses of the hormone parameters serum cortisol and DHEA-s were used on all occasions.

After 18 months a statistically significant advantage was observed for the art-based group: In particular, in the art group subordinates compared to those in the conventional group, there was significantly more improvement of mental health and constructive coping, as well as reduced performance-based self-esteem. In addition, there was significantly less of the expected winter/fall deterioration in the serum concentration of the regenerative/anabolic hormone dehydroepiandrosterone-sulfate, but no significant changes were found for cortisol.

DISCUSSION

The eight studies described above illustrate that it is possible to do quantitative evaluation studies using statistical analyses of health effects of arts interventions. Most of them have had relatively small statistical power, but despite this it has been possible to show statistically significant health effects. All of them need to be replicated using larger samples, and a more rigorous statistical design with pre-calculation of sample sizes is needed.

In several of our studies there have been statistical tests of many outcome variables – which means that there may have been risk of random "mass" significances. However, in those studies there have been significant effects in several domains (psychosocial as well as biological) that all point in the same direction. Both psychosocial and physiological variables have shown significant changes in the expected positive health direction. One important aspect of the multi-domain assessments in these studies is that it allows "triangulation." For instance, if there are positive effects of an arts intervention on regenerative hormones and at the same time positive mood changes and improved social activity, these observations mutually support one another.

Many different methodologies have been used, and it is impossible to present all of them here, due to limited space. The reader is referred to the original publications where the methods are described in detail. In general, however, we have used endocrinological and physiological measures as well as standardized questionnaires, such as measurements of mood and social activities constructed for more general purposes. Accordingly, no measures have been constructed specifically for these studies. This is intentional since we want to make our results comparable to those obtained in other intervention studies.

The way in which participants were recruited merits some discussion. Before randomization takes place, it is important that participants have been fully informed about the conditions of the study. This is one way of avoiding *differential attrition*. It is always important to bear in mind that the recruitment of participants may limit the generalizability of the findings. In the leadership study, we were very careful in designing the study in such a way that we would avoid differential attrition, and we were successful in this. However, in the preparatory stages many potential participants were contacted who were not willing to accept the conditions and therefore declined to take part. Accordingly, the two study groups were comparable and the differences between them reliable. But on the other hand, the participants in *both* groups were more willing to accept randomization and repeated data collection than managers in general.

Several other groups of researchers have examined various aspects of the biological effects of arts experiences. For instance, the effects of music listening on hormones and other chemical agents in the body (blood and saliva) have recently been reviewed by Finn and Fancourt (2018) who arrive at similar conclusions to ours regarding needs for stricter research designs. During our years in this research field, on a broader scale there has been a growing interest in the arts and health research field. This has recently been summarized by Fancourt and Finn (2019). The experience in our group has been that participants (from youngsters to elderly) are mostly willing to accept physiological and endocrinological measures and that arts interventions often show significant effects in such domains. This is of great help in our wholistic understanding of health effects of arts interventions. Careful measuring is often expensive, however. In our most recent study of subjects with dementia and their closest relative (Theorell et al., 2021), saliva hormone levels were measured daily both in mornings and evenings for 2 months and this was costly to undertake.

One example of more specific research is the organized choir singing for patients with lung disorders, such as chronic obstructive lung disease. A consensus has been reached (Lewis et al., 2016) that regular participation in choir singing for this group has beneficial effects on quality of life and that this helps patients cope with their difficult life situation although the studies also show that choir singing does not improve objectively measured lung function.

A similar research area is the health effects of choir singing for patients with mental disorders. Williams et al. (2018) recently showed in a systematic review that choir singing benefits quality of life for that group as well. Another widely accepted use of arts stimulation is dance and music therapy for patients with Parkinson's disease. A recent review (Pereira et al., 2019) was based upon five reviews and 40 experimental papers. The conclusion was that rhythmic stimulation and dance provide motor, cognitive, and quality of life benefits for participants with Parkinson's disease. Sound stimuli and dance offer measurable effects on gait and favorably affect cognitive abilities.

An important background variable that should be taken into account is genetic background. In a recent study of twins aged 27–54, we have shown that there is a statistically significant relationship between hours of lifelong practice of piano playing and ability to handle emotions (Theorell et al., 2014). This relationship, however, is pleiotropic. Ability to handle emotions and willingness to practice piano playing are both partly genetically determined, and when these relationships are combined in one model, the genetic background explains the statistical relationship between many hours of music practicing and good emotional ability. Still, cultural interventions can favorably affect ability to handle emotions, as shown for example in study 5. Accordingly, we need to take into account gene–environment interactions. One practical aspect of this is that intervention evaluations should preferably be based on large samples.

Among several outcome measures used in this research, regenerative hormones (testosterone and DHEA-s) have played an important role. Is there any stimulative effect of arts experiences on the excretion of regenerative hormones? Is so, this could be a link between cultural activities and health in a broad sense. Among the five studies that have included these measures, two were studies of long-lasting chronic conditions (fibromyalgia and long-lasting psychosomatic conditions), whereas three were studies of less serious conditions (normal ageing, irritable bowel syndrome and working managers with their employees). It was observed that the interventions did not have any significant regeneration effects in the chronic conditions whereas there were observable effects in the more "normal" groups. This is also an observation that needs follow-up.

The studies point at possible practical applications for primary schools, psychosomatic care, and care of elderly as well as programs for improved management. But as was pointed out by Fancourt and Finn (2019) there are numerous systematic reviews indicating other potential applications. It is time for larger rigorous evaluation efforts on a societal level.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

FUNDING

This is a review of several projects with several funding agencies.

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Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
published: 04 January 2022
doi: 10.3389/fpsyg.2021.773227

The Psychological and Biological Impact of "In-Person" vs. "Virtual" Choir Singing in Children and Adolescents: A Pilot Study Before and After the Acute Phase of the COVID-19 Outbreak in Austria

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OPEN ACCESS

Edited by:
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Reviewed by:
Diana Mary Blom, Western Sydney University, Australia
Helena Daffern, University of York, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *09 September 2021*
Accepted: *25 November 2021*
Published: *04 January 2022*

Citation:
Grebosz-Haring K, Schuchter-Wiegand AK, Feneberg AC, Skoluda N, Nater UM, Schütz S and Thun-Hohenstein L (2022) The Psychological and Biological Impact of "In-Person" vs. "Virtual" Choir Singing in Children and Adolescents: A Pilot Study Before and After the Acute Phase of the COVID-19 Outbreak in Austria. Front. Psychol. 12:773227. doi: 10.3389/fpsyg.2021.773227

Psychobiological responses to music have been examined previously in various naturalistic settings in adults. Choir singing seems to be associated with positive psychobiological outcomes in adults. However, evidence on the effectiveness of singing in children and adolescents is sparse. The COVID-19 outbreak is significantly affecting society now and in the future, including how individuals engage with music. The COVID-19 pandemic is occurring at a time when virtual participation in musical experiences such as singing in a virtual choir has become more prevalent. However, it remains unclear whether virtual singing leads to different responses in comparison with in-person singing. We evaluated the psychobiological effects of in-person choral singing (7 weeks, from January to March 2020, before the COVID-19 outbreak) in comparison with the effects of virtual choral singing (7 weeks, from May to July 2020, after schools partly re-opened in Austria) in a naturalistic pilot within-subject study. A group of children and young adolescents (N = 5, age range 10–13, female = 2) from a school in Salzburg, Austria were recruited to take part in the study. Subjective measures (momentary mood, stress) were taken pre- and post-singing sessions once a week. Additionally, salivary biomarkers (cortisol and alpha-amylase) and quantity of social contacts were assessed pre- and post-singing sessions every second week. Psychological stability, self-esteem, emotional competences, and chronic stress levels were measured at the beginning of in-person singing as well as at the beginning and the end of the virtual singing. We observed a positive impact on mood after both in-person and virtual singing. Over time, in-person singing showed a pre-post decrease in salivary cortisol, while virtual singing showed a moderate increase. Moreover, a greater reduction in stress, positive

change in calmness, and higher values of social contacts could be observed for the in-person setting compared to the virtual one. In addition, we observed positive changes in psychological stability, maladaptive emotional competences, chronic stress levels, hair cortisol, self-contingency and quality of life. Our preliminary findings suggest that group singing may provide benefits for children and adolescents. In-person singing in particular seems to have a stronger psychobiological effect.

Keywords: virtual choral singing, in-person choral singing, music, children, adolescents, cortisol, COVID-19

INTRODUCTION

The need for cultural participation has been recorded since prehistoric times (Fancourt, 2017: 3). Recent research supports the hypothesis that music-related activities such as singing promise a wealth of positive applications to human behavior, health, and psychological well-being in both non-clinical and clinical populations, including the elderly, adults, children and adolescents (cf. MacDonald et al., 2012; Bernatzky and Kreutz, 2015; Kreutz and Nater, 2017; Grebosz-Haring and Thun-Hohenstein, 2018, 2020).

This corresponds to the evidence that music-related activities are capable of inducing emotional-affective phenomena and can generate and regulate emotions (Panksepp and Bernatzky, 2002; Juslin and Västfjäll, 2008; Koelsch, 2014), improve mood (Koelsch et al., 2010; Grebosz-Haring and Thun-Hohenstein, 2018), relieve stress (Pelletier, 2004; Thoma et al., 2012; Linnemann et al., 2015, 2017), and encourage social behaviors (Koelsch, 2013).

Moreover, neuroimaging studies of healthy participants have shown that the experience of music leads to the activation of manifold cortical and subcortical neural networks (Altenmüller and Schlaug, 2012) and the midbrain area that are implicated in emotions, reward, and motivation (Blood and Zatorre, 2001; Panksepp and Bernatzky, 2002; Bernatzky et al., 2015). Thus, there is emerging evidence that music experiences affect not only psychological mood changes but also induce biological responses (Grebosz-Haring and Thun-Hohenstein, 2018; for the possible effects of music-driven emotions on changes in hormone systems effectors, see Koelsch, 2014). The positive valence (pleasurable experience) of music seems to be of great relevance for these effects (see e.g., Blood and Zatorre, 2001; Brown et al., 2004).

Different biological responses to musical activities have been reported with respect to a range of biological outcomes such as salivary cortisol (e.g., Beck et al., 2000; Fancourt et al., 2016; Schladt et al., 2017) and salivary alpha-amylase (Nater et al., 2006) in healthy and clinical individuals (Koelsch and Stegemann, 2012; reviewed in Chanda and Levitin, 2013; Fancourt et al., 2014). Cortisol itself is a central active agent in the stress response, indicating activity of the hypothalamic-pituitary adrenal (HPA) axis (Kirschbaum and Hellhammer, 1994). Over the course of the day, the highest level is reached in the 30-45 min after waking up, the lowest is reached around midnight, whereas salivary alpha-amylase, indicating autonomic nervous system activity (ANS) (Rohleder and Nater, 2009; Strahler et al., 2017), shows the opposite pattern. The early afternoon can be considered a suitable time window for assessing potential changes in the activity of the HPA axis and the ANS induced for example by music-related activities (Berg et al., 2018). In contrast to these salivary biomarkers which reflect rather short-term and momentary fluctuations of the activity of the biological stress systems, cortisol accumulated in hair is considered a valid long-term marker of cortisol secretion over prolonged time periods (Stalder and Kirschbaum, 2012).

Choir singing in particular appears to be associated with positive biological response patterns in adults (Beck et al., 2000; Kreutz et al., 2004; Fancourt et al., 2016; Schladt et al., 2017). However, little is known about whether singing has a beneficial effect also in children and adolescents. In this context, preliminary studies of young people suggest that singing together in a group has a positive impact on psychological as well as biological indicators in this population (Grebosz-Haring and Thun-Hohenstein, 2018, 2020; overview in Glew et al., 2020). For example, adolescent patients with mental disorders who took part in a 5-day group singing intervention experienced a significant decrease in salivary cortisol levels compared to those in a 5-day music listening intervention (Grebosz-Haring and Thun-Hohenstein, 2018). Moreover, participation in a *Singing Medicine Project* helped children to express themselves and was associated with a reduction in negative emotions (Blackburn, 2020).

Studies in adults also suggest that group singing has a positive impact on social and emotional outcomes (Bullack et al., 2018; Moss et al., 2018), and can evoke a feeling of belonging and resilience (Daykin et al., 2020).

The COVID-19 outbreak and the stay-at-home and quarantine orders issued by governments produced the largest enforced isolation period in human history (Fancourt et al., 2020), which led to a radical change in people's behavior and has had a serious impact on life for the majority of people all over the world, including children and adolescents. In Austria, this population had to stay home during lockdown in spring 2020 (from March 16th until May 15th) and were confined to home-schooling *via* internet. Interactive courses were offered, but it was not possible to have any real social meetings, such as visits with friends, or any sports or music education. About 10-15% of all children stopped attending school because of missing financial or technical support. Furthermore, unemployment levels rose and home office models increased significantly, thus increasing the pressure for families to adjust their lives during this and the following periods of pandemic-related lockdown. After the end of the lockdown, students in elementary, middle and high school programs returned to in-person classes. Classes were divided into

smaller groups and taught on a rotating basis. In addition, there were strict hygiene measures in place and students were required to wear a mask whenever they left their assigned seat. Sports and music-related activities (in school or as an extracurricular activity) were not permitted anywhere.

The severe effect of the pandemic on children and adolescents has been documented in several areas (e.g., Ravens-Sieberer et al., 2020, 2021; de Figueiredo et al., 2021). For example, an online survey (Schabus and Eigl, 2021) of the emotional state of children and adolescents aged 6–18 years during the coronavirus pandemic in Austria shows that children and adolescents face significant challenges due to the situation and have difficulty seeing things in context. Furthermore, feelings of anger, annoyance, loneliness and sadness increase and there is an alarming deterioration in sleep quality and an increase in sleep problems (ibid.). The data from the study suggest quick action to curb the psychosocial, developmental and health-related damage in this young and vulnerable age group (ibid.). In addition, as children enter the pre-pubertal and pubertal age, profound changes take place in their socioemotional development, social behavior and status, and the functioning of stress-responsive systems. Interference in these adaptive developmental processes might increase the risk of behavioral problems and psychopathology (Spear, 2000; Foley and Weinraub, 2017; Roberts and Lopez-Duran, 2019; Jones et al., 2020). Therefore, particularly in times of lockdown and school cancelation, there is a need for easily available early interventions and prevention strategies in young individuals. In this context, musical activities such as choir singing seem particularly promising.

Music has played a great role in the Covid-19 pandemic. For example, data from a thousand individuals in Italy, Spain and the United States (Mas-Herrero et al., 2020) shows that music-related activities were the most popular ideas to cope with the psychological distress of the pandemic. Participants who were more severely affected by the COVID-19 pandemic reported a higher level of music-related activities during the first lockdown, which was a positive means of coping with psychological stress caused by the pandemic. The study also found that music-related activities were associated with decreased mental health symptoms during the pandemic, most likely mediated by the activation of pleasure and reward processes. Moreover, the study by Granot et al. (2021) found that music helps more than other daily activities in dealing with the crisis. It is an efficient means for achieving goals related to well-being under extremely stressful situations in different age groups, cultures and genders. Furthermore, it was suggested that music during the COVID-19 pandemic can regulate mood (Mas-Herrero et al., 2020; Cabedo-Mas et al., 2021) and stress (Fink et al., 2021), and reduces loneliness (Martiìn et al., 2021).

The study by Chiu (2020) compares the musical activities of the Milanese during an outbreak of the plague in 1,567 with the musical activities (e.g., balcony singing) during the Covid-19 lockdown and investigates how music regulates the mood and maintains social cohesion in such times. The Milanese in 1,567 used community music activities to cope with their condition, just as people in the last year met on their balconies and sang together to lessen their fears and isolation. People experienced a feeling of connectedness and happiness through the balcony singing. Furthermore, there are countless COVID-19 and quarantine-related playlists on music streaming platforms like Spotify that are created and shared by users. The social function of allowing people to connect through shared music made these playlists very meaningful for many people.

Virtual meetings during the lockdown have become popular to maintain social and professional life, including engagement with musical activities. Virtual choirs in particular provided a semblance of "normality" to many singers during the COVID-19 lockdown in the United Kingdom (Daffern et al., 2021). Participants realized through the loss of singing together how important choir singing was for their well-being. Virtual singing was a poor substitute, but since it maintains social contacts and a sense of well-being, it was better to have this opportunity than not to sing at all. People who are not so familiar with the internet encountered difficulties, as getting online can be challenging. In general, however, technology (e.g., better internet connections) must improve so that virtual choirs can become a part of our reality (ibid.). It is important to mention that different models of virtual singing were adopted, e.g., multi-tracked virtual choir (see e.g., Fancourt and Steptoe, 2019), which is not real-time virtual singing and different from in-person choir singing. Theorell et al. (2020) examined what happens when choir singers lose their routines due to COVID-19. The authors found that the social aspect of singing was perceived as the greatest loss.

However, the effectiveness of virtual choir singing in young people during the COVID-19 lockdown requires further investigation. This is important because understanding the patterns of singing across lockdowns could help organizations plan for future musical activities. Furthermore, understanding how young people respond to virtual singing could enhance our understanding of the effect of this art of musical activity on mental health and well-being.

Virtual singing has become prevalent as a helpful method to connect with other people. Virtual musical activities may remain important to the well-being of individuals who cannot participate in in-person musical activities (Fancourt and Steptoe, 2019). A study on virtual singing in adults (Fancourt and Steptoe, 2019) examined the differences in the perception of social presence and the use of emotion regulation strategies between singers of an in-person choir and singers of a virtual choir. According to this study, singing in a virtual choir was associated with a higher overall perception of social presence, as the singers used more self-development strategies, fewer emotion-regulation strategies and fewer avoidance strategies (for example distraction) than singers in an in-person choir. Possible explanations could be that members of a virtual choir are treated both as group members and as soloists at the same time; they could improve themselves by recording their contributions; and the decision to sing in a virtual choir could go along with the desire to improve self-confidence in singing (ibid.).

However, it remains unclear whether a virtual musical activity such as choir singing is feasible in children and adolescents and whether it leads to the same psychobiological responses as in-person singing in this group of participants. Consequently, the present study aims to explore the potential psychobiological effectiveness of in-person and virtual choir singing on children

and adolescents and to assess whether virtual singing has the same effects as in-person singing during a strict lockdown period.

MATERIALS AND METHODS

Study Design and Participants

The data from this naturalistic pilot within-subject study of in-person group singing versus virtual group singing were collected in the context of a control trial registered at ClinicalTrials.gov (Identifier: NCT01921088[1]).

The goal of this larger study was to examine the biopsychological responses to choir singing (amateur and professional) in different clinical and healthy populations of children and adolescents and to understand the biopsychological mechanisms underlying choral singing in order to determine its full potential, particularly for vulnerable populations. The study protocol was approved by the Salzburg State Ethics Committee (reference number 415-E/2554/5-2019).

The whole study consisted of five months of singing interventions and included children and adolescents (10–18 years) with mental disorders, healthy children and adolescents from schools in Salzburg, and members of the Vienna Boys' Choir in Austria. The study commenced on January 16th, 2020 at the Christian Doppler Gymnasium in Salzburg, and on January 13th at the Upper Secondary School of the Vienna Boys' Choir. Recruitment at the schools lasted from September 2019 until January 2020. On March 6th, 2020, as a result of the first strict lockdown (stay-at-home order) because of the COVID-19 pandemic, the choir sessions had to be stopped; in order to continue the project after the first acute phase of COVID-19, the study was adjusted and the in-person singing activity at the Christian Doppler Gymnasium in Salzburg was continued as a virtual singing activity. The choir sessions at the school in Vienna had to be stopped.

For the current analysis, we used data from one of the researched groups, namely, from healthy students at the Christian Doppler Gymnasium in Salzburg who participated in the in-person choir for the first few weeks before the COVID-19 lockdown period and later on participated in the virtual choir singing intervention that was continued after schools partly re-opened as the lockdown was eased. 10 participants were screened for eligibility to participate in a choir and 10 were enrolled. All 10 enrolled patients entered the singing sessions. Three participants dropped out of the in-person singing sessions and two dropped out of the virtual singing sessions because of difficulties with time management. In the statistical analysis, we only included participants who took part in both the in-person and virtual singing sessions. Overall, 5 (50%) participants completed the study and were analyzed (see **Figure 1** for study flow).

The inclusion criteria were that participants had to be 10–18 years old. Participants were ineligible if they were diagnosed with any significant hearing impairments (according to a self-report and the patient's file) or an inability to verbalize.

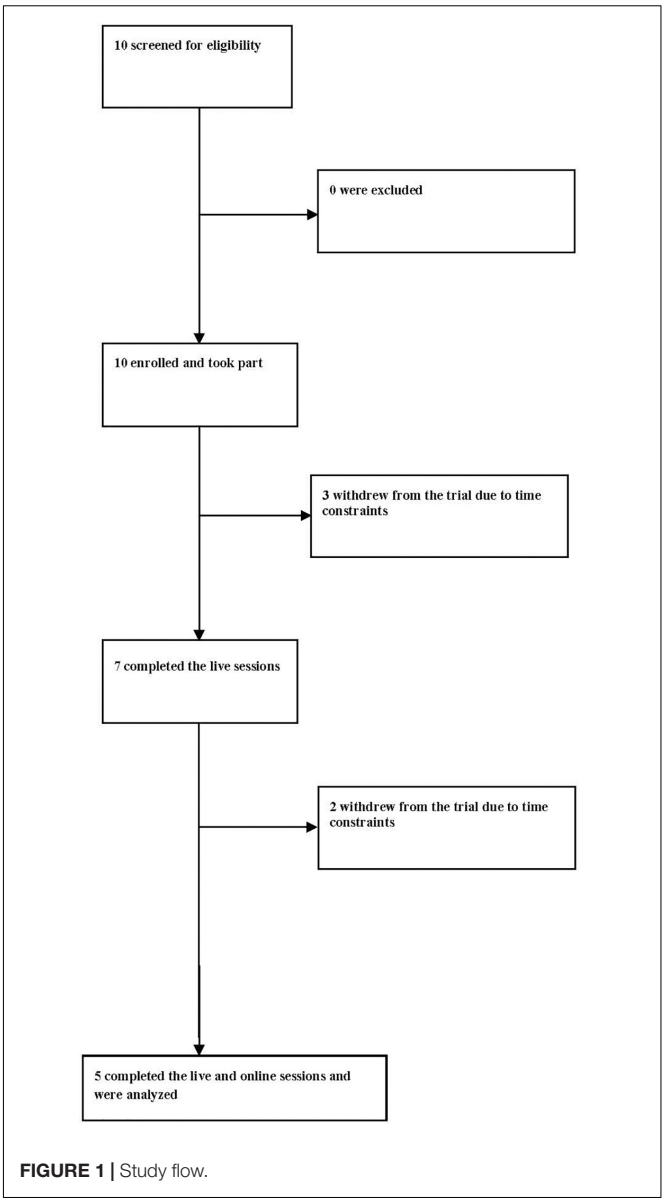

FIGURE 1 | Study flow.

Participation in the study was voluntary. Written informed consent from each participant and parent or legal guardian was obtained prior to the study. Compensation of two Euros per choir session and of three Euros for completing the data at three additional time points (at the beginning of in-person singing as well as at the beginning and the end of the virtual singing) was given to every participant. The changes to the pilot study (e.g., moving virtual) were approved by the Salzburg State Ethics Committee.

Procedure

We wanted to maintain the original study design as much as possible and therefore did this pilot study according to our definitive controlled study.

Participants took part in seven in-person singing sessions running from January 16th to March 5th 2020 (7 weeks before

[1]http://www.clinicaltrials.gov/ct2/show/NCT04454736?cond=singing&draw=3&rank=14

the COVID-19 outbreak). The in-person singing sessions were provided as a 45-min group session once a week. Due to circadian variations in salivary biomarkers, sessions were carried out in the afternoon between 1:00 and 4:00pm. Prior to the first choir singing session, parents delivered data regarding socio-demographic characteristics. The participants also filled out a questionnaire on musical background. Additionally, they completed a series of questionnaires (for details, see Chapter 2.3. Data) and provided hair samples. Baseline data was filled out by students with the help of a research assistant at their school.

Subjective measures of participants' momentary mood and stress were administered pre- and post singing session. Additionally, the participants gave feedback regarding their aesthetic experiences of the choir activity after each session. Salivary biomarkers and social contacts were assessed pre- and post singing sessions every second week. When possible, participants were asked not to consume any meals, alcoholic drinks, coffee, tea, cola, juices, or chewing gum, and to refrain from smoking for one hour before the measurement of each singing session.

All sessions were led by a professional choirmaster. Each choir session initially focused on an approximately ten-minute-long physical activation, vocal warm-up (sounding, making the voice sound, coming out of the speaking voice, increasing high and low resonance), and attention exercises. Throughout the rest of the session, new songs in various styles and languages chosen by the choirmaster as well as songs familiar to the participants were rehearsed (see **Appendix 1** for the used songs literature and **Appendix 2** for a detailed description of the choir session). Due to the practical considerations in a rehearsal choir situation, the singing repertoire was chosen by the choral conductor; however, there was also a possibility for participants to choose their own songs, including familiar ones. During the singing sessions, the choral conductor frequently asked the participants for feedback on the songs. He asked them if they liked them and if they wanted to sing the songs again. He was open to any new repertoire and allowed the choir members to participate in the decision-making process. In selecting repertoire, the conductor prioritized pieces that were not too difficult for casual singers and that were also liked by the young participants. Previous studies indicated that participants' familiarity with and liking of songs had a positive effect on their cortisol levels (Grebosz-Haring and Thun-Hohenstein, 2018) and led to the activation of specific limbic and reward-processing areas of the brain that regulate endocrine responses to favored, or self-chosen (Blood and Zatorre, 2001; Salimpoor et al., 2011), and pleasurable music (Brown et al., 2004). We therefore assume that these conditions in the singing sessions may have contributed to the positive psychobiological effects. Furthermore, the chosen repertoire was intended to involve different kinds of vocal work, including musicality, diction, timbre and part-singing.

After schools partly re-opened in Austria, the participants took part in seven virtual singing sessions running from May 28th to July 9th 2020. The duration of the virtual choir singing sessions and the procedure were the same as in the in-person choir singing sessions.

For the virtual sessions, participants were asked to meet the research assistant in front of their school in different time slots to receive the score sheets for the choir sessions, the series of questionnaires, materials for saliva sampling, and the equipment for the hair samples. The material was handed over to each person in an envelope so an appropriate distance could be maintained. Subjects completed the same series of questionnaires and provided hair samples at the beginning and at the end of the virtual singing sessions. Due to the COVID-19 situation, participants had to fill out the survey at home on their own. Participants were offered online help from the research assistant whenever needed. The within-session (pre-post singing session) measurements were conducted online (in a digital format) with the help of the research assistant.

Virtual singing sessions took place through the video-conferencing platform Zoom (Zoom Video Communications, San José, California). The participants sang the same kinds of songs as in the in-person singing sessions (see **Appendix 1**). New songs were introduced regularly to expand the repertoire (see **Appendix 1**). In the virtual choir, participants could see each other and sang together in real-time. However, participants were in their own individual physical locations and could only hear the choirmaster and themselves singing solo; they were not able to hear other choir members, who sang in parallel over the video call. Due to the technical limitations of Zoom, the choirmaster was also unable to hear the choir members. Sometimes one or two participants had connection problems with the internet and were unable to adequately participate in the choir session. They logged in and out repeatedly, but other participants continued to sing without interruption. Some had switched off their cameras, but turned them on again when the choir conductor explicitly requested that all cameras should be switched on so that everyone could see each other and feel more like they were part of a choir.

Data

We collected the data on a number of outcome measures used in a definitive study, which would allow us to address our research questions and to assess the acceptability and usefulness of the measures for inclusion in a larger study as well.

Socio-Demographic Variables and Musical Background

At baseline, parents filled out questionnaires on socio-demographic variables (see **Table 1** for the used variables). Additionally, participants filled out a questionnaire on their habitual music preferences (MPQ-KJ; adapted version for children and adolescents based on the adult version Music Preference Questionnaire-revised; MPQ-R; Nater, 2003). Musical background (*current and past musical activities*) was assessed through dichotomous *yes* vs. *no* items *(I play/have played one or more instruments, I take/took singing lessons, I am playing/was playing in a band, I am singing/was singing in a choir, I am/was a member of an orchestra*).

Perception of Singing Sessions

The participant self-report questions on aesthetic experience were used to assess the perception of the singing session.

TABLE 1 | Participant characteristics.

	(*n* = 5)	ID 2	ID 3	ID 4	ID 5	ID 7
Age (years): median	10	10	10	13	13	10
Age max	10					
Age min.	10					
Gender						
Female	2	1	0	0	0	1
Male	3	0	1	1	1	0
Citizenship						
Austria	5	1	1	1	1	1
Parent income (net)						
1,000–1,999	1	0	0	0	1	0
2,000–2,999	1	1	0	0	0	0
3,000–3,999	1	0	0	1	0	0
4,000–4,999	1	0	0	0	0	1
5,000–5,999	1	0	1	0	0	0
Finance comparison to general population						
slightly worse	1	0	0	0	1	0
slightly better	3	1	0	1	0	1
markedly better	1	0	1	0	0	0
Employment status mother						
Employed	3	0	1	1	0	1
Unemployed	1	1	0	0	0	0
In education	1	0	0	0	1	0
Employment status father						
Employed	4	1	1	1	0	1
Not declared	1	0	0	0	1	0
Education mother						
Compulsory school	1	1	0	0	0	0
Higher School Certificate	2	0	0	1	0	1
University degree	2	0	1	0	1	0
Education father						
Vocational school	1	0	0	0	1	0
Higher School Certificate	3	1	1	0	0	1
University degree	1	0	0	1	0	0
Musical background						
Currently playing an instrument	2	0	0	1	0	1
Currently singing in a choir	1	0	1	0	0	0
Previously playing an instrument	3	0	1	1	0	1
Previously singing in a choir	1	1	0	0	0	0
Previously playing in an orchestra	1	0	0	1	0	0
Mental health diagnosis						
No	4	1	0	1	1	1
Not declared	1	0	1	0	0	0
Other medical diagnosis						
Yes	1	0	0	1	0	0
No	3	1	0	0	1	1
Not declared	1	0	1	0	0	0

Participants were required to rate how much they liked the choir session (*How much did you like singing in the choir today?)* and how much they liked the songs (*Did you like the songs?*) as well as their familiarity with the songs (*Did you know the songs?*) on a 5-point Likert scale ranging from 1 (*not at all* or *no*) to 5 (*very much* or *yes, all*) immediately after every choir session. High values are indicative for high liking and familiarity with the songs.

Subjective Stress Experience

Current subjective stress was assessed using a "Visual Analogue Scale" (VAS) single-item approach as suggested by Elo et al. (2003). Participants rated their momentary stress level (*How stressed do you feel at the moment?*) between 0 (*not at all*) and 100 (*very much*). A higher score indicates a higher level of subjective stress (Linnemann et al., 2017).

Subjective Momentary Mood

Current mood state was assessed using the "Multidimensional Mood Questionnaire" (MDMQ; Steyer et al., 1997; short form A), which consists of three bipolar scales: *good - bad mood* (GM), *alertness - tiredness* (AT), and *calmness - restlessness* (CN). The MDMQ is a well-validated tool for screening current mood state in clinical practice and research and is specifically appropriate for repeated measures within short intervals, with 12 items (4 items - 2 positive and 2 negative - on each of the three scales) on a five-point rating scale. For every subscale, the values of the corresponding items are added up, ranging from 4 to 24 per scale. A higher score suggests positive affectivity, wakefulness, and calmness, respectively.

Social Contacts

We assessed *quantity of social contacts* within the choir using the "Social Network Map" adapted to application with children and adolescents (Tracy and Whittaker, 1990; see also Linnemann et al., 2017) every second week (1, 3, 5, 7 in-person singing sessions and 9, 11, 13 virtual singing sessions) post singing sessions. The Social Network Map uses a graphical representation (so-called circle mapping technique; Tracy and Whittaker, 1990) to provide information on the network size of each participant within the choir. Every participant rated familiarity with the other participants, classified as best friends, friends, or acquaintances. Participants were asked to write down a number or symbol within the classifications for privacy reasons (Linnemann et al., 2017). The analysis of the social network map is based on the overall number of identifications, as an indicator of the quantity of social contacts within the choir (Tracy and Whittaker, 1990). A higher total number for the network indicates a higher social community within the choir (Linnemann et al., 2017).

Biological Measurements of Momentary Stress

Saliva samples for the analysis of salivary cortisol (sCort) as an indicator of the HPA axis as well as salivary alpha-amylase (sAA) as a marker indicating ANS activity were collected directly before and after every second choir session (1, 3, 5, 7 in-person singing sessions and 9, 11, 13 virtual singing sessions). Changes in values of sCort and sAA indicate ultimate responses of both stress-responsive systems to external situations and have been used in studies investigating the biopsychological effects of choir singing in previous studies (e.g., Kreutz et al., 2004). Before the sample collection, participants were instructed to rinse their mouths with water and to accumulate unstimulated saliva in the

oral cavity for two minutes. A research assistant indicated when two minutes had passed and signaled the participants to transfer the saliva into polypropylene tubes *via* a straw (SaliCap®, IBL, Hamburg, Germany).

During the virtual choir sessions, participants were asked to conduct the procedure for the collection of saliva at home before and after every second session. They were always instructed *via* video using the Zoom platform. Saliva samples were cooled in the freezer at home for a few days before a research assistant collected them on the next school day.

The saliva samples were stored in a freezer at −20°C at the Central Laboratory of the Christian-Doppler-Clinic in Salzburg until they were sent on dry ice for cooling purposes to the Biochemical Laboratory of the University of Vienna for analysis. Concentrations of sCort were measured using a commercially available luminescence immunoassay (IBL, Hamburg, Germany). sAA activity was determined from saliva samples using an enzymatic photometric test from DiaSys (DiaSys Diagnostics, Holzheim, Germany). sCort is reported in nmol/l and sAA activity is reported in U/ml. Intra- and interassay variances for sCort and sAA were below 10%.

Psychological Measurements of Psychological Stability, Self-Esteem, Emotion Regulation Strategies, Chronic Stress, and Quality of Life

These data were obtained at three time points in total: at the beginning of the in-person choir singing intervention and at the beginning and the end of the virtual choir singing intervention.

Psychological stability (parents' view) was assessed using the "Child Behavior Checklist" (CBCL; Döpfner et al., 2014). This checklist consists of problem scales which describe behavioral problems, emotional problems and physical problems. The total score of the scale was analyzed. A higher total score reflects less stability.

Self-esteem was assessed with the "Self-Esteem Inventory for Children and Adolescents" (SEKJ; Schöne and Stiensmeier-Pelster, 2016). The SEKJ consists of three scales with 23 items overall: Self-esteem level (H), Self-esteem stability (S), and Self-esteem contingency (K). A higher score on each scale suggests a positive self-esteem level.

Emotion regulation strategies were assessed using the "Instrument to Measure Emotion Regulation Strategies in Children" (FEEL-KJ; Grob and Smolenski, 2009). Adaptive and maladaptive strategies were analyzed using sum scores. A higher score in adaptive strategies means higher use of the strategy in regulating feelings, which is positive for well-being. A higher score in maladaptive strategies means higher use of the maladaptive strategy, which is detrimental to well-being.

Subjective chronic stress was assessed using an adapted version of the "Chronic Stress in Childhood Questionnaire" (CSiK; Richartz et al., 2009). The CSiK consists of 12 subscales with 41 items overall: *school overload/pressure to perform, worries/social overload, social pressure, discontent with school, social tension, social isolation in the family, conflicts with siblings, temporal overload, social isolation among peers*. The higher the score of each subscale, the higher the level of chronic stress. The CSiK was originally developed for children between 8 and 10 years of age based on the Trier Social Stress Scale (TICS; Schultz et al., 2004) for adults. Since perception of stress changes as children transition from childhood to early adolescence and beyond (Seiffge-Krenke et al., 2009), we decided to slightly adapt certain items in consultation with the authors of the CSiK.

We assessed *quality of life* using the Pediatric Quality of Life Inventory (PedsQL; Varni et al., 2001). Quality of life is measured with 23 items using a 5-point Lokert scale ranging from 0 (*Never*) to 4 (*Almost always*). Each item is categorized under one of the 4 subscales: *Physical Functioning* (8 items), *Emotional Functioning* (5 items), *Social Functioning* (5 items), and *School Functioning* (5 items). The subscales are summarized into the *Psychosocial Health Summary Score* (= sum of the items over the number of items answered in the Emotional, Social, and School Functioning Scales) and into the *Physical Health Summary Score* (= Physical Functioning Scale Score). The *Total Score* is based on the sum of all four scales. The higher the score, the better the quality of life.

Long-Term Markers of Cortisol Secretion

Hair cortisol was collected as a long-term indicator of cortisol secretion (Stalder and Kirschbaum, 2012). For the assessment of hair cortisol, 2-3 thin hair strands were collected close to the scalp in the posterior vertex region. For the baseline assessment, the samples were taken on site by a research assistant. For the intermediate and final survey, due to the Covid-19 situation and to avoid risk of contagion, participants were asked to take the samples at home with the help of their parents, and to bring them to a prearranged meeting point in front of their school. Cortisol accumulates in human hair and hair has a growth rate of about 1 cm per month (Wennig, 2000). Thus, 1 cm of hair close to the scalp is indicative of chronic stress during the past month. In the present study, we used 1.5 cm segments, since this length covered almost the whole time frame between the intermediate and the final assessment. Each hair segment was washed twice with 3 mL isopropanol to remove external contaminants and, after drying, was finely cut into 1-2 mm pieces; 10.0 ± 0.5mg of finely cut hair was then transferred to a 20 mL glass tube and 1.8 mL methanol was added to extract hair cortisol overnight for 18 h. Afterward, 1.6 mL of the extract methanol supernatant was transferred to a 3 mL glass tube and subsequently evaporated at 50°C under a stream of nitrogen until it was completely dry. For the determination of cortisol, samples were resuspended with 225 μL of ultra-pure water and then analyzed using luminescence immunoassay (IBL, Hamburg, Germany). Hair cortisol concentrations (HCC) are reported in pg/mg.

Statistical Analysis

First, data was analyzed descriptively. Due to the small sample size and ordinal scale of the majority of the analyzed variables, the median along with the minimum/maximum respectively interquartile range (IQR) were calculated. Graphical representation was achieved with boxplots, scatter plots and line plots.

Due to the small sample size and the ordinal scale of the data, non-parametric ANOVA-type statistics were used to compare longitudinal data, and the corresponding effect measure (Relative Treatment Effect [RTE]) was calculated according to

Noguchi et al. (2012). Calculating the RTE is useful in studies with a small sample size or scores that are composed of several items. An RTE > 0.5 indicates a tendency toward increased scores, whereas an RTE < 0.5 indicates a tendency toward decreased scores at a certain time point relative to all timepoints. When presenting the results of inferential analysis, the comparison between pre and post sessions was always made first, regardless of the setting (virtual/in-person). Next, the effects of in-person and virtual settings were compared, followed by additional analyses of and observations in the data. No inferential analysis was performed for test formats with three timepoints of measurement. These data were presented in a descriptive way only. Due to the exploratory style of the analyses, no p-value correction was applied. All tests were carried out at the 5% significance level. All calculations were performed using the statistical software R, version 4.0.2, with the package nparLD (Noguchi et al., 2012).

RESULTS

Participant Characteristics

Demographic characteristics of the participants are shown in **Table 1**. The median age of the five participants was 10 years, two participants were female and all participants were Austrian citizens. Most of the parents had a Higher School Certificate or above (mother and father $n = 4$) and were employed (mother $n = 3$; father $n = 4$). Household income varied among all participants from very low to very high; however, the majority of parents described their financial status as being better than the general population ($n = 4$). Participants reported having no diagnosed mental illness. Two of the participants were currently playing an instrument and one was currently singing in a choir. Three of the participants had played an instrument previously, one had been singing in a choir before and one had been a member of an orchestra earlier. None of the participants was taking one-on-one singing lessons or was a member of a band or an orchestra at the time of the study participation (see **Table 1**).

Perception of Singing Sessions

Participants liked both types of singing (in-person and virtual: median 5 on the 5-point Likert scale; see **Table 2**). The settings were rated equally by the participants in terms of the perception of singing sessions (*liking singing in today's session*; **Table 2**), but the perception of the songs (*liking songs in today's session*) in virtual singing setting was slightly higher than in the in-person setting (**Figure 2**). This resulted in a higher number of lower ratings (three and four on the five-point scale) in the in-person setting. Furthermore, in the virtual setting, the songs were more familiar to the participants than in the in-person setting (**Table 2**; see also **Figure 2**).

Subjective Stress Experience

Subjective stress was reduced pre to post by means of RTE from 0.58 to 0.42 without distinguishing between the type of singing setting (in-person vs. virtual); however, this change was not significant ($p = 0.27$). A comparison of the two settings showed a tendency toward different effects ($p = 0.09$). It seemed that there was a greater reduction of VAS in the in-person setting compared to the virtual one (RTE in-person: 0.75 to 0.49 vs. RTE virtual: 0.41 to 0.36). However, we observed higher values in general at the beginning of the sessions in the in-person setting in combination with higher scattering (**Figure 3**). In general, the values in both settings were very low (positive) overall according to the pre-measurements.

TABLE 2 | Median and range for singing session perception by activity.

		Median (Range)
Liking of choir sessions	In-person	5 (2 - 5)
	Virtual	5 (3 - 5)
Familiarity with songs	In-person	4 (2 - 5)
	Virtual	5 (3 - 5)
Liking of song	In-person	4 (3 - 5)
	Virtual	5 (1 - 5)

Subjective Momentary Mood

We found marked changes in pre-post-values of the current mood state, in the dimension mood valence as an effect of singing (independent of singing setting). On the basis of RTE, it can be observed that overall, the pre-values were lower than the post-values (RTE: 0.45 to 0.54; $p = 0.01$; **Figure 4**). Furthermore, a comparison of both singing settings in MDMQ scales showed that there was a significant pre-post difference between the settings in current mood state in the dimension calmness ($p = 0.001$): in-person sessions brought an increase in the dimension calmness (RTE 0.3 to 0.56), while the value in the virtual setting remained almost the same (RTE 0.55 to 0.58; **Figure 4**). No significant pre-post differences between the settings were found in the dimensions mood valence and alertness. Interestingly, the values (both pre and post sessions) in the virtual setting were significantly higher in all of the three scales (mood valence $p = 0.06$; calmness $p = 0.004$; alertness $p = 0.003$) compared with the in-person setting (see **Figure 4**). However, in general, we observed that the values in the mood scales were very high (positive) at the beginning of sessions in both settings (in-person/virtual; see **Figure 4**).

Social Contacts

The social network map shows that the values for the in-person singing setting were higher than for the virtual singing setting; not unexpectedly, during the virtual singing setting, we observed a reduction in the number of social contacts (**Figure 5**).

Salivary Cortisol

Overall, across all data, the results showed significantly lower sCort values after the singing sessions (independent of singing setting): the RTE pre-value was 0.59 and post-value was 0.40 ($p < 0.001$; **Figure 6**). Furthermore, a comparison of the pre to post sessions in the two settings (in-person/virtual) indicated a tendency toward different effects ($p = 0.06$). While a decrease of sCort pre to post session was observed in the in-person setting, in the virtual setting the level of sCort

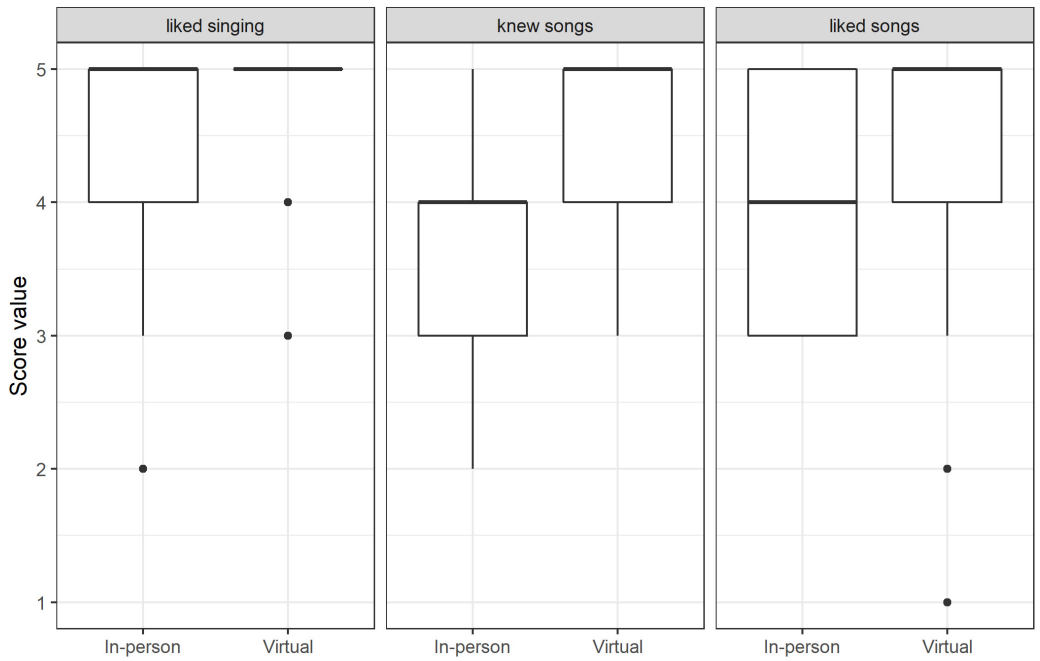

FIGURE 2 | Score values of singing activity perception (median and range): in-person singing vs. virtual singing (*n* = 165 data points for all categories).

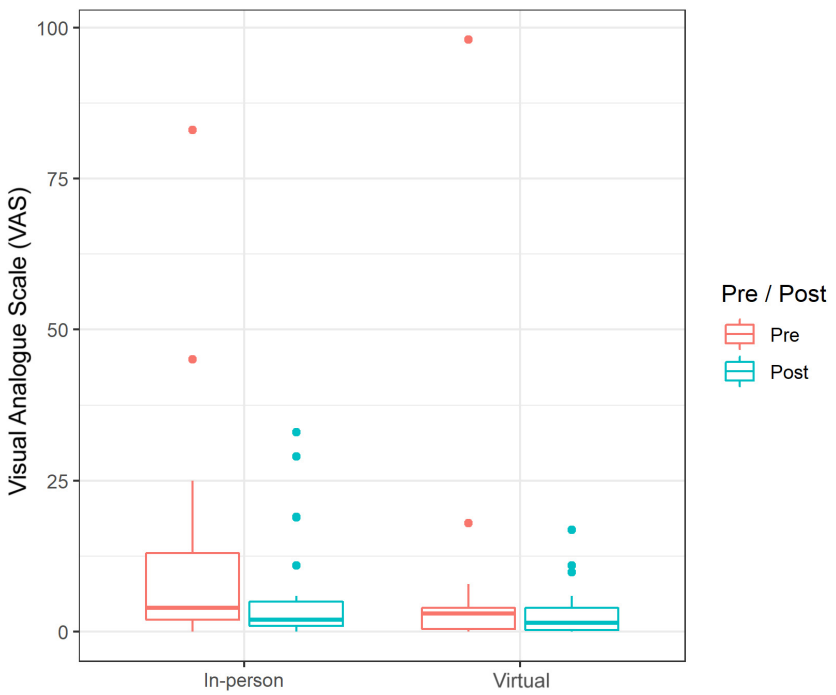

FIGURE 3 | Absolute score values (pre-post) of current stress experience (median and range) on the Visual Analog Scale: in-person singing vs. virtual singing (*n* = 111 data points).

even increased pre to post session (RTE in-person: 0.70 to 0.22 vs. RTE virtual: 0.50 to 0.59). In general, we observed that over time, the level of sCort in the pre-values remained relatively the same in in-person sessions; the post-values even increased over the course of the samples, but there was still always a pre-post decrease (see **Figure 6**). In contrast, the progression in the virtual setting is somewhat variable. The median remained relatively the same in the first session, increased

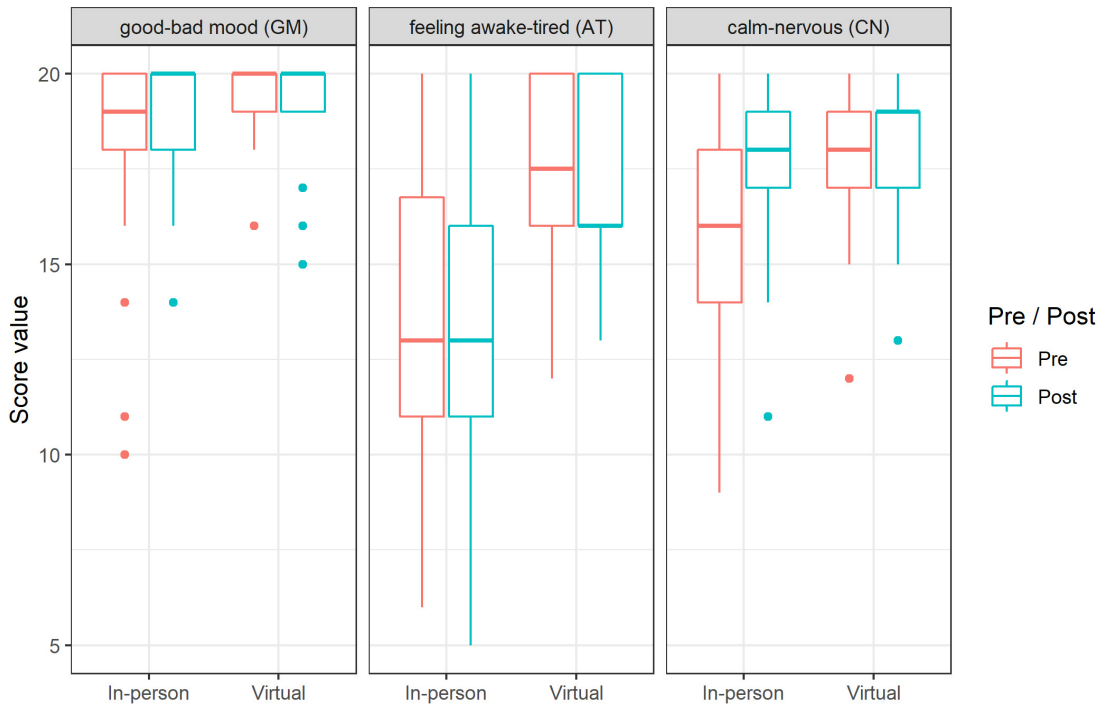

FIGURE 4 | Changes (pre-post) in the MDMQ subscales (median and range): in-person singing vs. virtual singing (n = 330 data points).

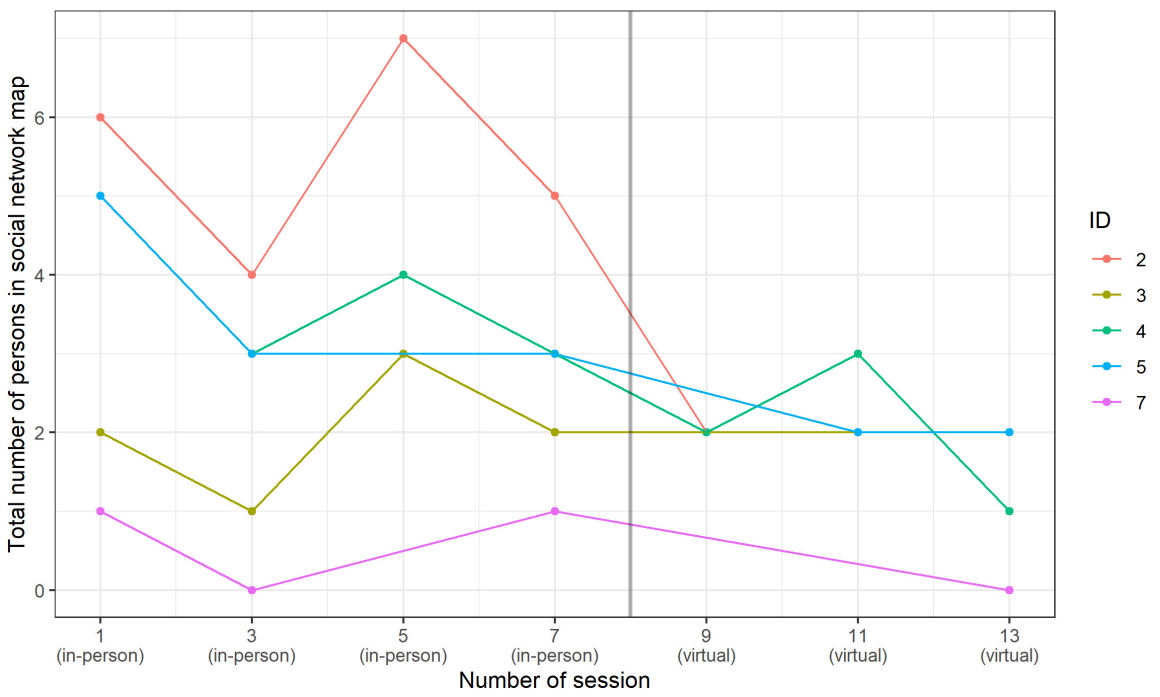

FIGURE 5 | Number of social contacts in Social Network Map by session: in-person singing vs. virtual singing.

in the second session and decreased in the third session. However, it should be noted that very little data was available for the virtual sessions (e.g., in the second session, data was only available from two participants) and only three measurements (not four, as with the in-person sessions) took place (see **Figure 6**).

Salivary Alpha-Amylase

Overall, the data showed significantly higher values of sAA after the singing sessions (independent of in-person/virtual singing; RTE pre 0.46 to 0.54; $p = 0.02$). A comparison of the effect of the singing settings showed no significant differences in the pre-post-values of sAA. However, interestingly, we observed significantly higher values of sAA in general (regardless of pre to post) in the virtual singing setting compared to the in-person singing setting (RTE virtual: 0.67; RTE in-person: 0.33) (**Figure 7**).

Psychological Stability (Parents' View)

In **Figure 8**, the results are shown in a box-plot graph demonstrating a visible reduction of psychopathological symptoms over the three time points. The reduction occurred mainly between the first and second time points of the measurements. A slight decline in psychopathology was observed between the second and third times point of the measurements (see **Figure 8**).

Self-Esteem

Results for the SEKJ show no change in the subscales self-worth and self-stability, but a distinct increase in self-contingency at time point two, which remained high until the end of the study (see **Figure 9**).

Emotion Regulation

For results of FEEL-KJ, see box-plot graph in **Figure 10**. Between the first and second time point, the adaptive emotion regulation total score increased, and between the second and third time point, it went back to the values at the first time point. In contrast, the maladaptive emotion regulation total score decreased across the three time points, thus improving over time. According to the subscale levels, the median for adaptive regulation increased for adaptive anxiety and grief at time point 2 and returned to the values of period 1, but this did not apply to adaptive anger. Maladaptive anxiety and grief showed a continuous decrease over all three time points.

Chronic Stress

Results of the CSIK show a continuous decrease in the values of the scales SUE (school overload/pressure to perform; Median baseline: 19; Median intermediate: 10.50; Median post: 8.0), S (worries/social overload; Median baseline: 6.0; Median intermediate: 6.00; Median post: 4.0), SP (social tension; Median baseline: 9.0; Median intermediate: 7.50; Median post: 6.0), G (conflicts with siblings; Median baseline: 6.0; Median intermediate: 4.00; Medina post: 3.5), and ZUE (temporal overload; Median baseline: 7.0; Median intermediate: 6.00; Median post: 5.0). The scale SD (social pressure) showed a decrease and an increase (Median baseline: 7.0; Median intermediate: 5.00; Median post: 7.0), whereas the scale US (discontent with school) showed an increase and decrease (Median baseline: 6.0; Median intermediate: 9.00; Median post: 7.0). The scale SI (social isolation in the family) showed an increase during the time period (Median baseline: 11.0; Median intermediate: 11.50; Median post: 13.0). Scales SG (social isolation among peers), S1 (excessive demands/pressure to perform training/choir), S4 (dissatisfaction with training/choir sessions) and S9 (social isolation in the training group/choir community) did not change during the time period (see **Figure 11**).

0 = Baseline
1 = After end of lockdown/before virtual sessions
2 = End of virtual sessions

Quality of Life

Figure 12 shows the results from the PedsQL. During the baseline measurement, the range of the subscales varied. The emotional functioning scale showed the lowest value compared to the other subscales, followed by school functioning, physical functioning, and social functioning. The values of every scale increased visibly during the period after the end of the lockdown, before the virtual sessions. After the end of the virtual choir singing intervention, values remained high. The total score, based on the sum of all four scales, increased after the in-person choir activity and remained high until the end of the virtual sessions.

Hair Cortisol

Hair cortisol concentrations seemed to decrease from the baseline (Median: 2.120) to the intermediate (Median:1.980) and from the intermediate to the final assessment (Median:1.655) (see **Figure 13**).

DISCUSSION

The aim of this naturalistic pilot study was to examine the psychological and biological effects of choir singing on children and adolescents and compare the psychobiological effects of in-person and virtual choir activities in children and adolescents before and after the acute phase of the COVID-19 outbreak and resulting lockdown in Austria. In carrying out this study, we adhered as much as possible to the parameters of our definitive larger controlled study. Our results indicate that singing – especially as an in-person activity – is likely to have potential psychobiological benefits for children and adolescents. However, the pilot design and small sample size mean that caution must be taken in interpreting the results. This is the first study to investigate this issue in this population.

Results show that in general, participants enjoyed singing. They liked both the in-person and the virtual singing sessions, but they liked songs more in the virtual setting. An explanation for this could be that the participants were more familiar with the songs and evaluated them more favorably than in the in-person setting (the more the songs are known, the more positively the songs are perceived). The songs in the virtual setting were already better known because they had also been sung in the in-person-sessions. Previous studies suggested that familiarity and positive value of music is an important determinant for positive effect on mood and well-being (Blood and Zatorre, 2001; Brown et al., 2004; Grebosz-Haring and Thun-Hohenstein, 2018).

We found that mood increased positively after choir singing, regardless of whether it was in-person or virtual setting.

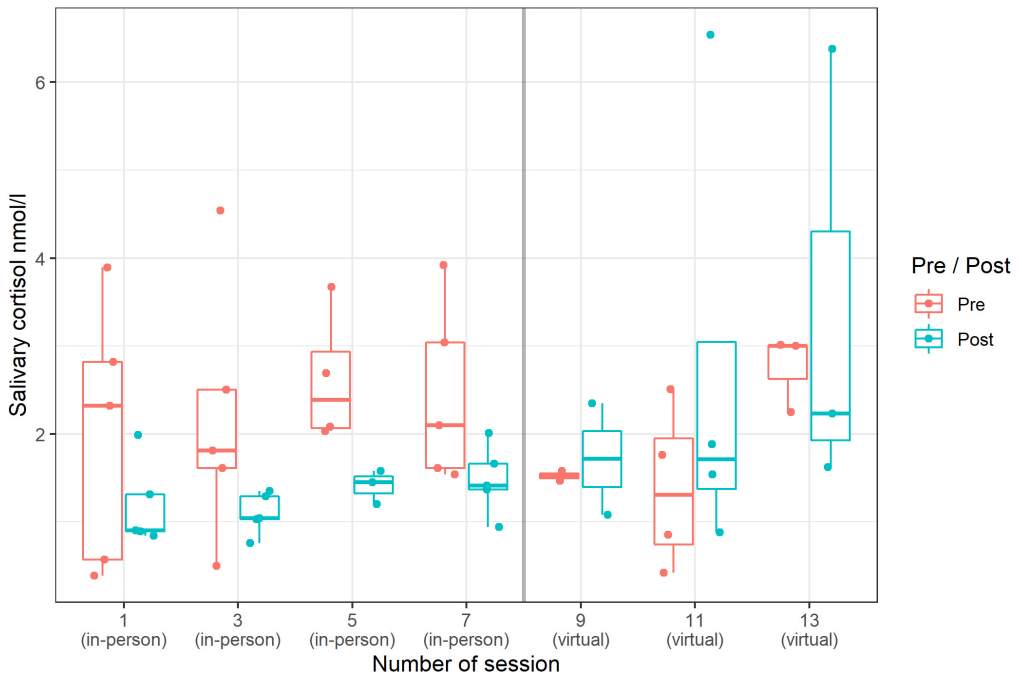

FIGURE 6 | Changes (pre-post) in sCort (median and range) by session: in-person singing vs. virtual singing (n = 55 data points).

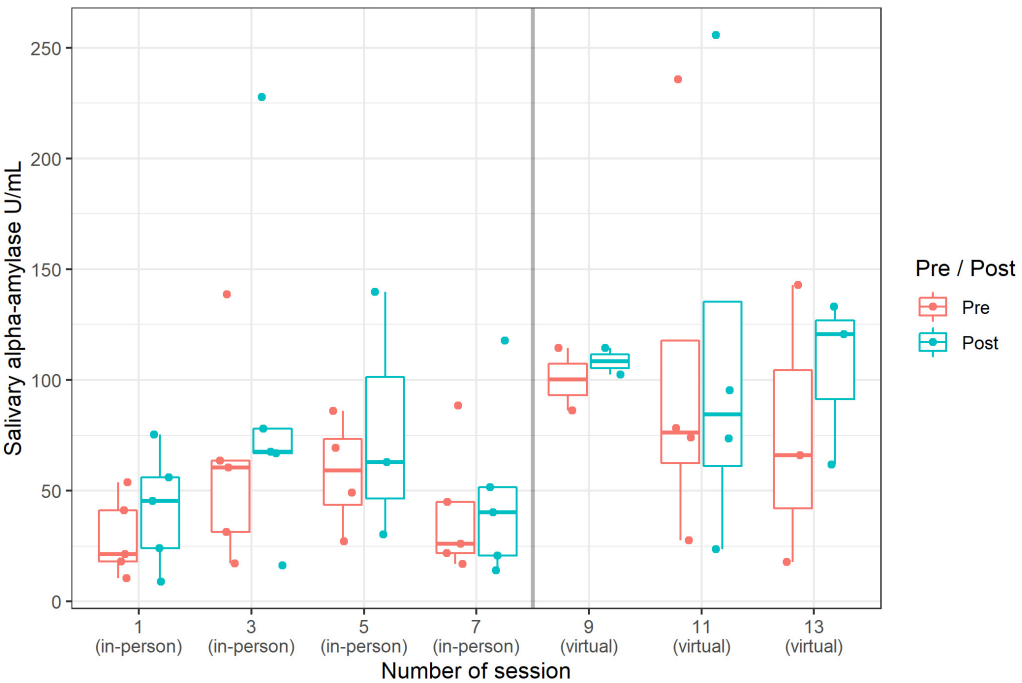

FIGURE 7 | Changes (pre-post) in sAA (median and range) by session: in-person singing vs. virtual singing (n = 55 data points).

Furthermore, we observed that there was a pre-post decrease in sCort levels in the in-person setting, but not in the virtual setting. In contrast, the pre-post values of sCort in the virtual singing setting increased slightly. The result from the in-person singing setting is in accordance with previous studies in adults (Beck et al., 2000; Fancourt et al., 2016; Schladt et al., 2017) and children and adolescents (Grebosz-Haring and Thun-Hohenstein, 2018), in which group singing was connected to lower sCort levels,

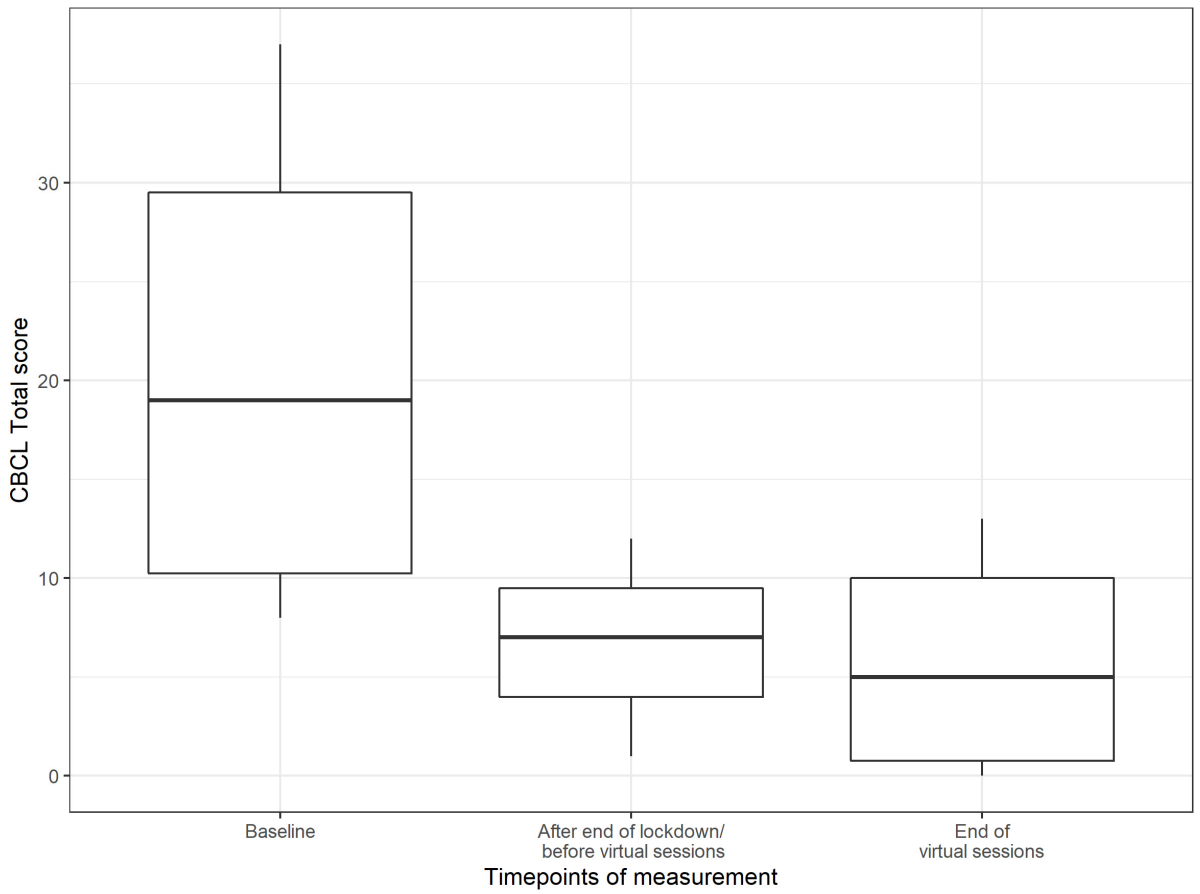

FIGURE 8 | Score value on Child Behavior Checklist by timepoints of measurement (median and range) (*n* = 11 data points).

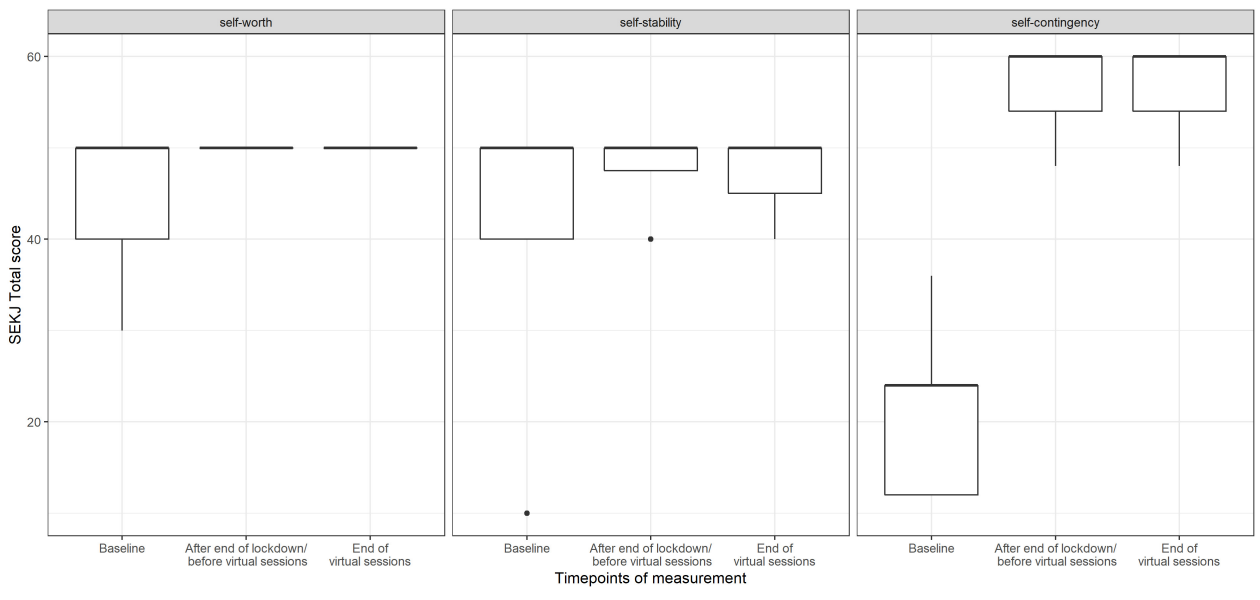

FIGURE 9 | Score value on SEKJ scales by timepoints of measurement (median and range) (*n* = 35 data points).

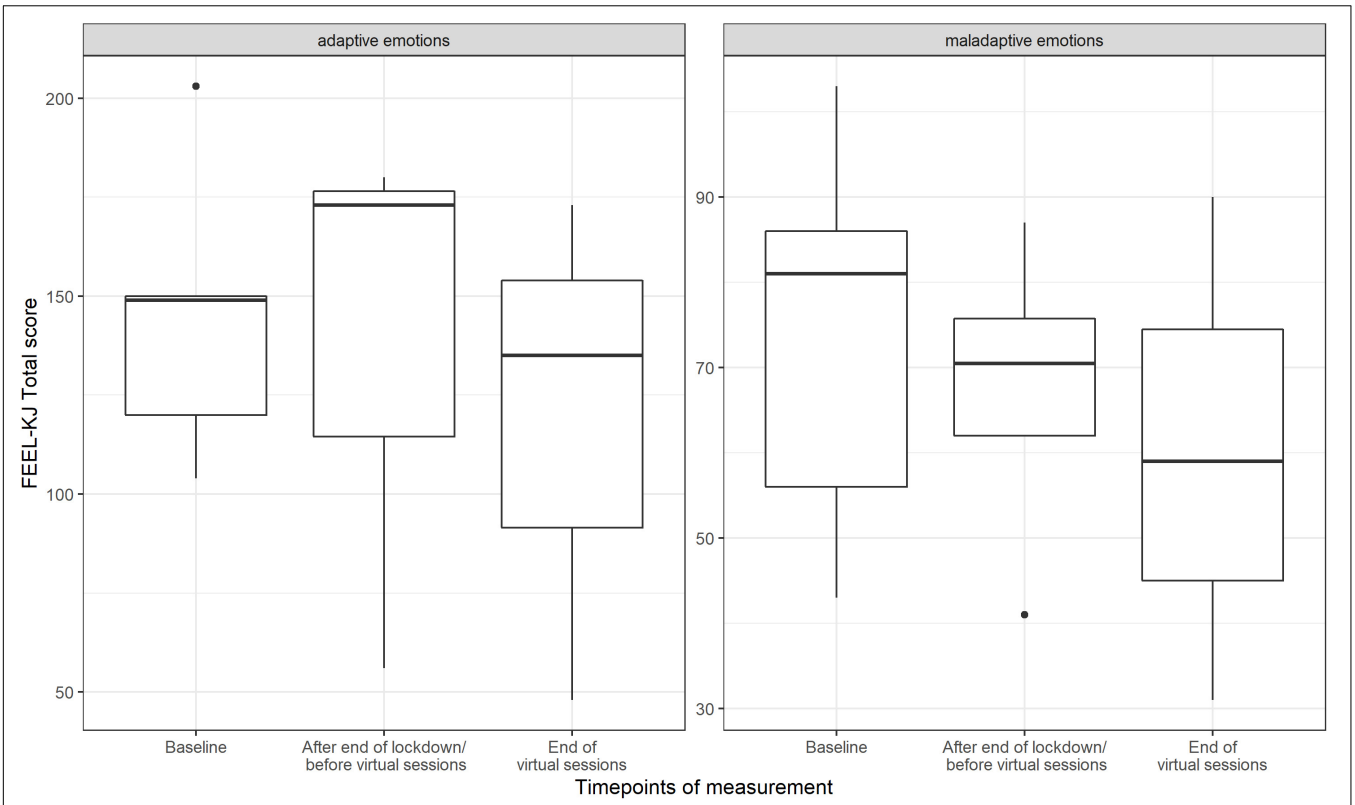

FIGURE 10 | Score value on FEEL-KJ scales (adaptive emotions, maladaptive emotions) by timepoints of measurement (median and range) (*n* = 23 data points).

suggesting that active group singing might have stress-reducing effects. In particular, our study suggests that a biological response is more visible after active in-person singing than after virtual singing. This could be related to the fact that the participants in the virtual setting could only hear themselves but not the other singers. Participants could see and have virtual social contact with each other, but they were not physically together in the same place. Their feeling of belonging to the group and the "choir experience" might have been reduced by this fact. Similarly, experiencing strong group dynamics in an in-person setting can also help to reduce stress (Olff et al., 2013; Tarr et al., 2014; Koelsch, 2018). Indeed, we observed that participants experienced greater social contact in the in-person singing setting; in contrast, in the virtual singing setting, fewer social contacts were reported. However, this result should be taken with caution because more participants took part in the in-person singing setting than in the virtual singing one. On the other hand, the low increase in sCort levels in the virtual singing setting in our study could be specifically related to the framework of the virtual singing sessions, including technical problems and other possible co-variates such as mood of the choir conductor. These factors should be included and examined as possible confounders in any analysis involving larger group sizes. However, due to the small group sizes in this study, this would not result in statistically meaningful results. Finally, since in-person singing is physically more demanding (this refers to the sedentary situation of not needing to leave the house to join in, or being seated in front of the screen during each singing activity) than virtual singing, it is possible that the differences in sCort levels in both groups could be attributed at least in part to the varying levels of physical activity, which can influence endocrine system responses (see e.g., Kreutz et al., 2004).

Surprisingly, across the sample and independent of the setting, we found higher values of sAA after the singing sessions. This might be due to the fact that singing can have an activating effect (moving the mouth alone such as while chewing stimulates the flow of saliva), which is reflected in higher ANS activity.

In keeping with the sCort data, we observed a greater reduction of subjective stress experience in the in-person singing setting compared to the virtual setting. Moreover, the in-person singing setting had a larger increase in the subjective measures of mood state, in the dimension calmness, whereas in the virtual setting the dimension calmness remained almost the same. These findings confirm results from previous studies, which reported a decrease in sCort levels accompanying the subjective reduction in anxiety and stress (Fancourt et al., 2016) as well as an increase in positive mood (Beck et al., 2000; Fancourt et al., 2016; Schladt et al., 2017) in response to in-person group singing in other populations. Interestingly, we could observe that in general in participants in the virtual setting the values (both pre and post sessions) of positive mood were higher and stress level lower compared to the in-person setting. This could be related to the

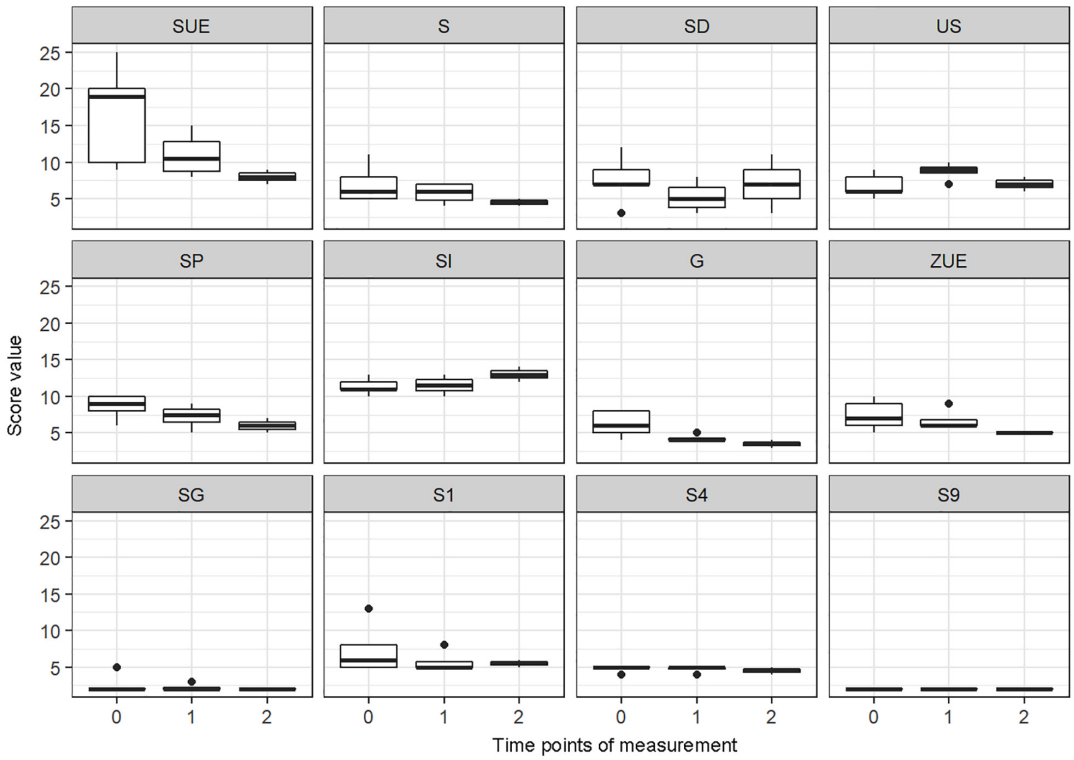

FIGURE 11 | Score value on CSIK scales: school overload/pressure to perform (SUE), worries/social overload (S), social pressure (SD), discontent with school (US), social tension (SP), social isolation in the family (SI), conflicts with siblings (G), temporal overload (ZUE), social isolation among peers (SG), excessive demands/pressure to perform training/choir (S1), dissatisfaction with training/choir sessions (S4), social isolation in the training group/choir community (S9) by timepoints of measurement (median and range) (n = 132 data points).

fact that the singing activity was more familiar to the participants. On the other hand, the generally lower values of positive mood and higher values of stress level in the in-person setting could be related to the fact that in-person choir singing has built-in tension due to the environment (without reflection on the choirmaster). Moreover, during the virtual setting, they were in their own environment.

The total score of the adaptive emotion regulation strategies for the feelings anger, anxiety and grief increased from the first to the second time period, which means that participants were able to regulate their emotions better. Interestingly, values decreased after the second time period, which started after the first lockdown and ended after the last virtual session. The study by Daffern et al. (2021) observes that for some participants, a virtual choir had a negative impact on their well-being, as it made them aware of what they really missed: being together. Not knowing when they will meet again makes people sad. This could be an explanation of our results. The total score of the maladaptive emotion regulation strategies decreased over the time periods. It is assumed that the emotion regulation strategies were used in a positive way and improved throughout the time periods. However, there may have been other influences on the data from this cross-sectional questionnaire besides the singing intervention, such as developmental changes and the lockdown situation, e.g. homeschooling.

We found that contingency of self-worth increased notably by the end of the study, whereas there was no change in self-worth and self-stability. Moreover, we observed that quality of life increased after the in-person choir sessions and stayed very high until the end of the virtual sessions. During the baseline measurement, the emotional functioning scale, which included questions related to anxiety, worry, sadness, anger, and insomnia showed the lowest value compared to the other scales. At the end of the virtual choir, an increase of values in all subscales (emotional functioning, school functioning, physical functioning, and social functioning) was observed. Previous studies showed the possibility that singing can improve quality of life in this group of participants (Grebosz-Haring and Thun-Hohenstein, 2018; Glew et al., 2020). The present data underlines previous findings. It is possible that because participants sang alone in the virtual setting, social demands decreased and thus contingent self-esteem, i.e., the comparison of oneself with internal and external values and norms, improved.

Finally, we observed a decreasing tendency in hair cortisol concentrations over the three time points. However, due to the small group size, the results should be considered with caution. Seasonal fluctuations could also have affected certain outcomes like saliva (Miller et al., 2016) and blood (Hadlow et al., 2014; Tendler et al., 2021) cortisol, because the hypothalamus-pituitary-adrenal axis varies with the season, although it is not

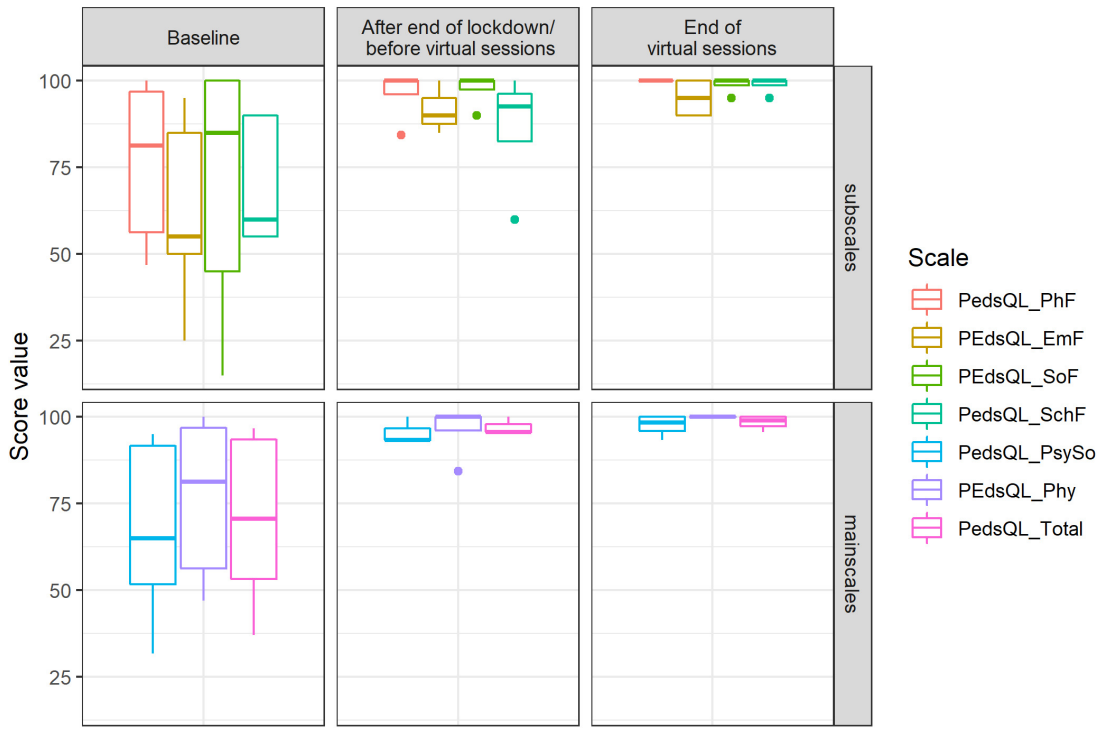

FIGURE 12 | Score value on PedsQL scales: physical functioning (PhF), emotional functioning (EmF), social functioning (SoF), school functioning (SchF), psychosocial health summary score (PsySo), physical health summary score (Phy), total score (Total) by timepoints of measurement (median and range).

empirically clear how strongly these influences are reflected in hair cortisol in humans (see Maimon et al., 2020). Previous findings are inconsistent and diverse, suggesting predominantly low hair cortisol in winter and high hair cortisol in summer (e.g., Braig et al., 2015; Fischer et al., 2017) but also high hair cortisol in winter (e.g., Abell et al., 2016) or no seasonal effect at all (e.g., van den Heuvel et al., 2020). Furthermore, hair cortisol itself (as well as other psychological outcomes) can also be affected by changed life circumstances and behaviors in the context of lockdown restrictions, such as less physical movement or different sleep patterns. Therefore, the results must be interpreted with caution.

Strengths and Limitations

This study is one of the few studies examining both psychological and biological markers associated with choral singing in adolescents, over a longer time period, in both in-person and virtual settings. This provides a very important foundation for future studies that examine the health-promoting effects of in-person and/or virtual choir singing. With more technical possibilities, it may be possible at some point to improve virtual choir experiences and thus maximize the psychobiological effects, especially in possible future pandemic or crisis situations that involve social isolation. Furthermore, we managed to transform the in-person choir sessions into virtual sessions and thus succeeded in adapting to the situation so that we could continue our investigation and compare in-person and virtual singing within a slightly modified context in the time of the COVID-19-outbreak. An additional positive factor was that choir members had the possibility to have aesthetic experiences and maintain social contacts during the difficult time of isolation within the first lockdown.

Our study has a number of limitations. First, it has a small sample size, so the preliminary findings must be interpreted with caution. The small number of participants was related to the challenge in recruiting study participants, since some potential candidates showed interest, but few agreed to participate. One reason given for not participating was the time commitment involved, since many children already had several afternoon activities. The small number of participants and high drop-out rate should also be mentioned as a potential bias in the results because of the personality type or inclination to respond to the activity. It could be possible that those participants who persevered with the data collection and attendance were particularly responsive to singing as a beneficial activity, while those who dropped out were not. Perhaps the differences in both groups should be examined. However, due to the small group sizes, this would not result in meaningful results and without a larger sample it is of course difficult to investigate such theories. Another limitation is that the psychological baseline data were obtained at three time points: at the beginning of the in-person choir singing activity, and at the beginning and end of the virtual choir singing activity. Due to the lockdown, we were unable to obtain any data at the end of the in-person choir singing sessions. Therefore, the results from the first to the second time point (across time periods) should be viewed with care. Any changes in these measurements could be very

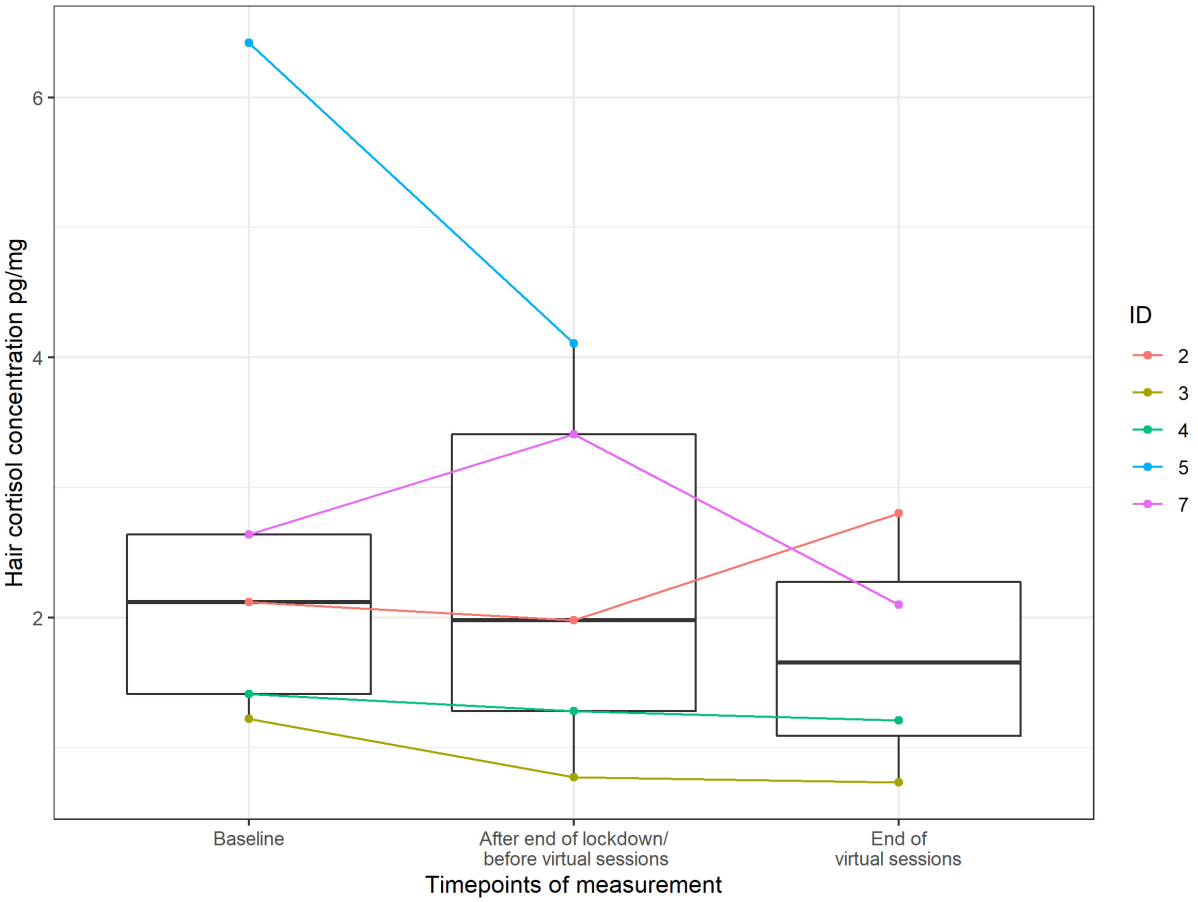

FIGURE 13 | Score value of hair cortisol by timepoints of measurement (median and range) (*n* = 88 data points).

strongly influenced by COVID regulations and cannot really be traced back to the choir intervention, since there is also no comparison or control group in the study design. The multitude of outcome measures, although they reflect a detailed picture of the effects of singing activities, also represent a limitation. Some data of the outcome measures were missing (e.g., CSIK) because participants were unwilling to provide them. The challenges in recruitment, including the small number of participants in our study and the number who withdrew, could be the result of an excess of questionnaires. As such, a future study should reduce the number of assessments and simplify the assessments that are carried out repeatedly. Moreover, due to the length of the study and the different seasons in which assessments were carried out (Assessment 1: autumn/winter, Assessment 2: spring, Assessment 3: spring/summer), we cannot exclude seasonal effects, rather than the effects of a specific musical activity, on certain outcomes like hair cortisol. A future study design should take this point into account. In our study, we controlled for liking of the music pieces and the choir sessions. Notably, our study did not include confounders such as the level of difficulty of the music, the singing condition of the participants, or the mood and engagement of the conductor. It is possible that biological markers such as cortisol are influenced by the conditions of the setting, rather than the in-person singing activity itself. However, due to the small number of participants, these conditions would not result in statistically meaningful outcomes. These conditions should be clearly included and investigated as possible confounders in a larger study.

Beyond these limitations, the COVID-19 pandemic presented major challenges to carrying out the study using conventional methodology. These challenges were due to the limitations in the interaction between participants and research assistants. Consequently, the research staff were not present when the saliva and hair samples were taken, so the procedure (despite detailed instructions) could not be monitored. However, there is research that shows that lay individuals can also carry out saliva and hair samples correctly if properly instructed (Schlotz, 2019; Skoluda et al., 2021). Moreover, storage conditions for the saliva samples between the coronavirus waves and from participant to participant were not standardized and may differ.

Notably, there were obstacles to virtual participation due to sound problems and a lack of reliable internet connections. It remains unclear whether these problems distracted and irritated the participants and whether they could lessen the positive effects of virtual singing sessions on cortisol levels.

Our virtual choir was a pilot project with preliminary findings that originated in the special circumstances surrounding COVID-19 and the resulting lockdown. Although there were

recruitment challenges, the pilot study has shown that it is possible to conduct a study using group singing activities in children and adolescents. Further research with correspondingly large participant numbers is needed to explain the responses to virtual singing and the differences between in-person and virtual conditions. Singing is suggested to benefit psychological and biological outcomes in children and adolescents. However, despite our current knowledge, we must better understand the psychobiological mechanisms underlying choral singing. A larger study with a control group is recommended to investigate this issue in this population.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The study involving human participants was reviewed and approved by Salzburg State Ethics Committee. Written informed consent to participate in this study was provided by each participant and participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

KG-H and LT-H conceived and designed the study. UMN and ACF contributed to the study design. KG-H and AKS-W performed the collection of data. SS performed the statistical analysis. KG-H and AKS-W contributed to the data analysis. The biochemical analyses were performed under the supervision of NS and UMN. KG-H drafted the first version of the manuscript. KG-H and AKS-W wrote sections of the manuscript. LT-H, UMN, ACF, and NS were involved in the final drafting of the manuscript, and provided critical feedback on the basis of their special areas of interest, which were incorporated into the final draft of the manuscript. All authors approved the submitted version.

FUNDING

Funding for this study was provided by Land Salzburg, Referat 2/04 – Kultur und Wissenschaft, the Salzburg Whitsun Festival and Programme Area Inter(Mediation). Music – Mediation – Context at the Interuniversity Institute on Knowledge and the Arts (Paris Lodron University of Salzburg and University Mozarteum Salzburg). The open access publication costs for the article were covered by Paris Lodron University Salzburg. The funders had no role in the conceptualization, design, data collection, analysis, decision to publish, interpretations, or preparation of the manuscript.

ACKNOWLEDGMENTS

We want to thank all participants for their time.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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APPENDIX

Appendix 1

Songs used in the choir sessions.

(1) "Let It Be" (written by Lennon/McCartney, performed by "The Beatles" and released in 1970).
(2) "Count on me" (written by Bruno Mars, Philip Lawrence, and Ari Levine, performed by Bruno Mars and released in 2011).
(3) "You raise me up" (music by Rolf Løvland, lyrics by Brendan Graham, released in 2002).
(4) "Das Maultier und das Faultier" (music by Uli Führe, lyrics by Jörg Ehni).
(5) "99 Luftballons" (composed by Uwe Fahrenkrog-Petersen, German lyrics by Carlo Karges, English lyrics by Kevin McAlea, released in 1983 in West Germany and 1984 in the United Kingdom) (introduced in the virtual choir sessions).
(6) "Zombie" (written by Dolores O'Riordan, performed by The Cranberries and released in 1994) (introduced in the virtual choir sessions).
(7) "Sweet Dreams" (written by Annie Lennox and David A. Stewart, performed by Eurythmics and released in 1983) (introduced in the virtual choir sessions).
(8) "Poco a poco" (Arr. Andy Icochea Icochea, Rodolfo Cázares, abducted in Mexico on July 9, 2011).
(9) "Jikijela" (transcription by Elizabeth Oltedal).

Appendix 2

Outline of the singing session.

The following goals are established:

Musical development

- Learning to use the singing voice in a healthy and sonorous manner.
- Getting to know and to play songs in different styles and languages.
- Singing well-known and popular songs.
- Acquiring basic skills for musical understanding (score, rhythm, and pitch).
- Homophony and polyphony, canon.

Personality development

- Being aware of one's voice (self-awareness).
- Learning to listen to each other (musically as well as interpersonally).
- Expressiveness – expressing the content of the voice.
- Strengthening group cohesion through common goals (and hopefully, success stories).
- Learning to maintain a self-, body-, and effect-conscious appearance.

Appendix Table | The breakdown of each lesson (45 min) is shown in the following table.

Warm-up.	Physical activation, vocal warm-up (sounding, making the voice sound, coming out of the speaking voice, and raising high and low resonances), attention exercises.	10′
Sing a well-known song (rehearse if necessary).	Passion for singing is awakened.	5′
Musical work on new or previously learned songs.	Varied, multifaceted rehearsals of musical elements: fast / slow; rhythmic / sustained; sonorous / voice-oriented; and active / passive participation in the rehearsal (e.g., in a voice rehearsal).	15′
Play a game to release tension.	Preferably includes personality-developing content.	7′
Qualitative singing of a previously learned song.	Define the qualitative claims. Consciously demand a self-confident appearance and awareness of the voice.	4′
End.	Energizing ending with a final song.	4′

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CONCEPTUAL ANALYSIS
published: 05 January 2022
doi: 10.3389/fpsyg.2021.732957

Enstranglements: Performing Within, and Exiting From, the Arts-in-Health "Setting"

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The following text explores performative art works commissioned within a specific "arts and health" cultural setting, namely that of a medical school within a British university. It examines the degree to which the professional autonomy of the artists (and curator) was "instrumentalized" and diminished as a result of having to fit into normative frames set by institutional agendas (in this case, that of "the neoliberal university"). We ask to what extent do such "entanglements," feel more like "enstranglements," suffocating the artist's capacity to envision the world afresh or any differently? What kinds of pressures allow for certain kinds of "evidence" to be read and made visible, (and not others)? *Are You Feeling Better?* was a 2016 programme curated by Frances Williams, challenging simplistic expectations that the arts hold any automatic power of their own to make "things better" in healthcare. It included two performative projects – The Secret Society of Imperfect Nurses, by Anthony Schrag with student nurses at Kings College London, and Hiding in Plain Sight by Becky Shaw (plus film with Rose Butler) with doctoral researchers in nursing and midwifery. These projects were situated in a climate of United Kingdom National Health Service cuts and austerity measures where the advancement of social prescribing looks dangerously like the government abnegating responsibility and offering art as amelioration. The text therefore examines the critical "stage" on which these arts-health projects were performed and the extent to which critical reflection is welcomed within institutional contexts, how learning is framed, expressed aesthetically, as well as understood as art practice (as much as "education" or "learning"). It further examines how artistic projects might offer sites of resistance, rejection and mechanisms of support against constricting institutional norms and practices that seek to instrumentalise artistic works to their own ends.

Keywords: performance, space, institutions, critique, Arts in Health, university, hospital

OPEN ACCESS

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *29 June 2021*
Accepted: *10 December 2021*
Published: *05 January 2022*

Citation:
Williams F, Shaw B and Schrag A (2022) Enstranglements: Performing Within, and Exiting From, the Arts-in-Health "Setting". Front. Psychol. 12:732957. doi: 10.3389/fpsyg.2021.732957

INTRODUCTION

The room looks sterile. Its floors and walls are a bland colour. There is a pile of nondescript stackable chairs in a corner. A pleated curtain draws around an empty bed. There is a trolley with some medical equipment on top of it. There is a table with a computer and a box of latex gloves. It appears to be a perfectly normal hospital room, and everything is still and quiet, like a stage before the actors arrive.

There is something wrong with the cupboard space, however. Some pillows appear to have fallen out. These attract a second glance and on closer inspection, a dark shape appears that seems out of place. Looking closer we see a shoe, a leg, and then it becomes apparent it is a person – a hospital worker – hiding, waiting. Someone enters the room, giggling, looking behind the curtains and behind the chairs. The person in the cupboard tries to hold their breath, become as small as possible and to disappear into the environment. But they are soon found, and the seeker helps the hider unfold herself, all the while both laughing. They disappear into another booth, looking for more people hiding.

The performative work, Becky Shaw's Hiding in Plain Sight is discussed in greater depth below, but is a useful place to begin, as it poses a neglected question about how or where arts and health practices collide or coalesce, and the types of "space" in which such actions take place.

In an academic paper that takes stock of recurring challenges besetting research in the field of Arts in Health, a number of gaps or "lacunae for further investigation" are usefully identified (Raw et al., 2012). These authors call for future studies that can help theorise the "nature of the project space created by artists" and those "participatory artists working within health and community settings" in particular. Some of the affective qualities already ascribed to such spaces, created by artists, are listed and comprise: "a sanctuary or suspended, protected space, where new things are possible" (White, 2004; Gould, 2005; Sixsmith and Kagan, 2005; Kilroy et al., 2007; Putland, 2008). Spatial concepts drawn from psychoanalytic traditions – such as platforming and liminal space – are also referenced in order to show how change is made possible within creative contexts, spaces and structures (Atkinson and Robson, 2012). Load-bearing metaphors have also been deployed – alongside spatial ones – to show how art practice offers "a means of support to carry one over the threshold of change," (Elliott, 2011).

Our paper aims to do a couple of things. Firstly, to respond to the call made above; unpacking, complicating and extending the challenge to explore the "space" produced by arts practice in healthcare. We explore two live artworks that made space "for" performance – "through" performance – within the pre-existing structure of an institution of higher education. The projects were developed between artists and healthcare students around the theme of Utopia. Yet, in their treatment and interpretation of this topic, they resist the idea of any exo-space or ideal society located in some far away place. Instead, they situate potentials for change within "secret," "hidden," and "fugitive" spaces close-at-hand within the institution.

Secondly, we wish to bring into relation with "Arts in Health" research, those discourses and practices which draw on the long traditions of "institutional critique" in the arts. This tradition offers a context in which to discuss the terms on which "criticality" in arts-health is drawn, offering relevant points on the nature of artist agency relative to institutional power – including supra-national institutions such as the World Health Organisation – alongside those more everyday institutions we more commonly operate with and within (the local-global context of the University, or Contemporary Arts Institution).

In the following, we explore the conditions of the commissions and how the particular constraints, contradictions and affordances of the (concurrently, laden and dissolute) institution, germinated these respective live works. Exploring ideas of utopia, (Jacoby, 2005), we explore these works as examples of "instituent practices" (Raunig and Ray, 2009). Like "third wave" (the third generation of) forms of institutional critique explored by Raunig and Ray, the commissions here were utterly responsive to, and dependent upon, the conditions that generated them. Yet these same conditions also produced the projects' tendency toward becoming invisible. Shaw and another artist – Anthony Schrag – "suffer" this institutional evaporation at the same time as working with it tactically.

We conclude by exploring the extent to which this research into the "spaces" created through Arts in Health practice can contribute to a different kind of research "agenda." Rather than seeking to clarify, simplify or extrapolate, we aim to capture a "whole" about the reality of the commissioning context here. Though no less "evidence," such an approach refuses debate about quality or efficacy to propose a value in making a critical space for others. Importantly, we argue, it might offer an alternative way to do "criticism."

THE (HEAVILY LOADED) COMMISSION

Devised by artists Becky Shaw and Anthony Schrag, the two projects, *Hiding in Plain Sight* and *The Secret Society for Imperfect Nurses*, were part of an education programme for healthcare students developed at King's College London (KCL), curated by Frances Williams[1]. *Are You Feeling Better?* was the title of a programme very deliberately built around concepts of human potential and "betterment."

Williams' intention was to deploy the phrase playfully, if not to undermine, then certainly to throw open, any simplistic prescription of culture as an automatic good, something to be consumed in order to cure ills. The programme was devised, instead, as a way to hold the promises of healthcare to account and also question the goals of academic achievement set in place by higher education. Any sense of ambivalence the question might have been able to foster here was forged within, as much as against, the wider institutional agenda – on the *a priori* terms set out for such (self) reflection and critique.

Are You Feeling Better? was just a single strand in a far broader, expansive season of events that ran across KCL's many schools and departments in 2016. It represented the healthcare-student-education component of a year-long celebration of Thomas More's book, Utopia, and was described as the "largest ever" festival of its kind. The 500th year anniversary of the book's publication was marked by an array of prestigious cultural bodies across the United Kingdom capital, involving in turn, many high-profile contemporary artists (such as Jeremy Deller).

King's College London (KCL) is London's oldest and largest education and research establishment. Its own mission statement harbours no small degree of Utopian intent: "through

[1]Two of four commissions in total.

FIGURE 1 | Image of meeting space from the Secret Society of Imperfect Nurses. Anthony Schrag.

world-leading and outward-looking research, focussed on meeting societal need, King's will make the world a better place" (Sholette, 2010, 2015; Utopia 2016 website, 2016). KCL chose to align their own strategic mission alongside the promise of More's book, branding 2016 "a year of imagination and possibility."

> *Throughout UTOPIA 2016. . . people from all walks of life will be invited to experiment with new ways we might live, make, work, play and dream. We will create physical and virtual spaces where positive visions are nurtured, supported and celebrated, and where anything is possible (Utopia 2016 website, 2016).*

This marketing strapline was typical of the high ambitions KCL claimed for itself. It had, at this time, a prominent cultural leader in Baroness Deborah Bull (2012 – 2019) who set in motion various collaborations across KCL's inter-disciplinary territories, as well as fostering partnerships between KCL and neighbouring cultural bodies. These included Somerset House (an arts body who now occupy the grand 17th century buildings of the former tax office, alongside The Thames) as well as The Courtauld Institute of Art (keeper of historic collections of priceless works of art). As well as developing key strategic partnerships between these eminent organisations, Baroness Bull also created a brand new organisation, namely the Cultural Institute.

The Cultural Institute was intended to act as an internal catalyst for change at KCL, one that could work to help respective departments to collaborate, enabling them to "connect through culture" (Utopia 2016 website, 2016). An independent, freelance Producer (Andy Franzkowiak) was engaged by the Cultural Institute to explore the theme of Utopia through a summer exhibition at Utopia 2016 website (2016). Like Williams, he also enlisted artists, researchers and students around this theme. But this programme was more squarely titled, *Paths to Utopia,* and focussed on collaborations with science staff, rather than having a particular focus on health or education *per se.*

It was intended that artists from *Are You Feeling Better?* would contribute, in smaller part, to this exhibition. They were indeed included as part of a rotating programme held in an adjunct space, titled *Utopia Lab*. The materials displayed here from *Are You Feeling Better?* including films and a booklet, were presented as documentation (as they unfolded out of sight, mainly as interactions between people in preceding months behind the scenes of this public facing exhibition). In this respect, the power-configuration was traditionally orthodox: arts education projects were situated in a shady demimonde and accorded lower status than the more spectacular forms of fine art which are more traditionally respected.

Are you Feeling Better? was thus held within many concentric circles of devolved commissioning (and similarly smaller allocations of financial resource). These configurations already differentiated what was "good" from what was "better," what was public-facing and what was hidden, and what spatial and affective perimeters the works were supposed to obligingly perform within. Part of Utopia Lab's planned limitation was informed by inherited assumptions about curation and its relation to

FIGURE 2 | Image of doctoral students playing hide and seek in Hiding in Plain Sight, Becky Shaw.

FIGURE 3 | Schrag holding "be perfect" placard from the Secret Society of Imperfect Nurses. Anthony Schrag.

FIGURE 4 | "Seeker" trying to grab "Hider" during hide and seek game, from Hiding in Plain Sight, Becky Shaw.

education that have been articulated by those within the field. "Gallery education is typically situated at the edge" within institutional formations and is "overshadowed" by other activities (Allen, 2008, 9). While the Utopia Lab space alluded to the fluid, dialogic, intentions that lay behind New Institutionalism, the respective remits in this case were split across two rather than one curator role. In this way, they remained separate and fixed (and unequal).

New Institutionalism, so named, (Farquharson, 2013) was built on the affordance of independent curators who, in the increasingly flexible working terrain of the 1990s, brought a desire to establish new power relations and commissioning configurations within the (art) institution. They embraced education's dialogic potentials (if not the sub-field of "gallery education" *per se*) (Mörsch, 2011). Key curators became embedded in, or built, small and medium-sized arts organisations at this time, intent on working for change "from within." In the words of one such curator, these smaller-scale models were "proud to be maladjusted" as they did "not adjust themselves to an art community obsessed with knowledge, power, and scale." (Huberman, 2011). While the rhetoric of the "experimental" *Utopia Lab* nodded to the motifs of new institutionalism, it was encompassed and nested within the broader Utopia programme – one which measured its impacts though size and scale.

Williams was engaged, then, as a subsidiary freelance producer to explore how healthcare students could be enticed from KCL's four Health Faculties (Nursing and Midwifery, Medicine, Dentistry and Psychology, Psychology and Neuroscience) to engage with artists around the theme of "health utopias." She reported to the Research and Education Manager at the Cultural Institute who in turn reported to the Director, thus positioned at the end of a line of complex managerial structures, not employed as part of the institution, but a participant in the gig-economy which operated at its fringy edges. A Student Engagement Manager who directly facilitated Williams' personal introductions to staff and students left toward the end of the project. Working on a similar contractual basis to Williams, this was a vital human link, (if one easily cut).

Passing down-the-line any sense of potential within this distinctly hierarchical arrangement of finance, responsibility and power, the space in which Shaw and Schrag could develop their work was already informed by a series of prior intentions and power-relations (and sly, counter intentions too, one might conclude). The complex and contradictory terms of the commission thus exerted great influence on how their respective live works could be made, who they might engage with, and how the work would be subsequently received.

BACKDROP TO THE "ACTION"

On inheriting this brief, the possibilities open to the curator and the artists felt as constrictive as they did expansive. "My task of engaging hard-pressed students to give time to projects whose outcomes no-one could yet imagine, felt challenging, to say the least" (Williams, 2016). Space for students to work with artists only became apparent "in the fissures and cracks between study and work placements" (Williams, 2016).

Students were not only pressured by exam expectations but were also working at a time of a high-profile dispute between NHS staff and its employees. The Junior Doctors strike provided a backdrop of anger centred around the struggle to maintain existing contractual terms amongst medics who had recently graduated. Students staged walkouts in support and suspended regular work patterns in order to protest and protect their future pay levels and contractual working conditions.

This dispute had been characterised by the Health Secretary and his collaborators, as one in which the designation of weekends as rest time had become unworkable, presented as an unaffordable utopian ideal. As one nursing student, who later became a project participant noted: "In a world of underfunding,

understaffing, excessive workloads and crushed ideals, the notion of utopia seemed fanciful" (Jackson, 2016).

Acknowledging these feelings of disillusionment, Williams hung-out on picket lines and saw the need to make any "cultural offer feel a little bit counter-cultural too" (Williams, 2016). Warned away from engaging too directly in political developments through the commissions, she was steered by her commissioners, toward enlisting healthcare student populations previously unreached by previous engagement projects. As a means to this end, Williams was introduced to two vocal student community leaders, Mavis Machiori, (a Ph.D student in nursing and midwifery) and Tim Owen Jones, (a student representative for nursing students). Williams presented the project offer to them as an unusual opportunity for healthcare students to develop a "special kind of space" together with invited artists, "to talk about work, but not as part of work" (Williams, 2016).

Within this parallel trammel, it was hoped that some degree of critical distance and reflection might be enabled through the material processes of working with artists. A similar possibility was captured by the journal About Performance when seeking to foster a special edition- they noted a desire to create "the necessary distance for health professionals and health consumers to become critically reflexive - to see more clearly what values and identities are (re)produced by the performativity of health systems – and to intervene in processes of systemic change." (Call for Papers for Performing Care, About Performance 2018 journal now ceased).

But in an educational and institutional environment where high performance is drilled into the student ethos as a prerequisite for success and resolution, and in a clinical environment where evidence-based care is so firmly entrenched, what space is there for a "slacker," more open-ended enquiry? The project began to explore how to counter this multiple context of suffocating pressures, and experiment with how projects could nudge or tilt these paradigms in a performative, process-led manner. Williams, Shaw and Schrag were also cognisant that the institution's emphasis on the final exhibition would hierarchically demonstrate knowledge, value and learning rather than generating any reflective space to examine the student's own individual contexts, politics and learning. In this sense the projects did not separate out the usually delineated contexts of art, healthcare and culture (or to take for granted the construction of "art and health" as a separate world to "art") but attempted to grasp and work with their combined pressures.

THE SECRET SOCIETY FOR IMPERFECT NURSES

The Secret Society of Imperfect Nurses emerged out of conversations between Anthony Schrag and student nurse, Tim Owen Jones. It sought to provide a space to discuss the pressures of perfection – the utopian values that student nurses felt they had to always live up to. As well as being based around the question of whether imperfect people could embody utopian values, more importantly perhaps, it also asked questions about whose utopian values nurses might be expected to embody.

Conversations focussed on how pressures of perfection are both professionally and socially demanded; the internal drive to adhere to those high standards are premised upon emotional labour and historical assumptions of nursing practice. To be a nurse is to live in the shadow of Florence Nightingale; to be endlessly hardworking; to have inhuman levels of empathy; and to never, ever make a single mistake: to be utopian.

In *Picture Imperfect: Utopian thought for an Anti-Utopian Age* (2005), Russell Jacoby argues that utopias are important because it is through them that we develop aspirations, and from those aspirations we develop political change:

> *Utopian thinking does not undermine or discount real reforms. Indeed, it is almost the opposite: practical reforms depend on utopian dreaming. . ..Utopian thought consists of more than daydreams and doodles. It emerges out of and returns to contemporary political realities. . ..this contradiction defines the utopian project: it partakes at once of the limited choices of the day and unlimited possibilities of the morrow (Jacoby, 2005:146).*

Utopias therefore have a political imperative because they espouse the promise of an alternative world order. However, due to the heterogeneous and pluralistic nature of societies that contain different and often oppositional politics, the plurality of these political agendas and the impossibility of each and every utopian future being true means that utopias are always bound to fail. Not all utopias can come to fruition, and it is those with the most resources who will make their perfect world more true and real than those less resources. Utopias are therefore built by, and for, the powerful.

Jacoby does not argue that, because of this, we should consequently abandon the search for a better world, but rather he suggests that imaginary possibilities of utopias (in general) are an important social and developmental mechanisms and not mechanisms of policy and legislation. He recognises that utopias have a generative relationship to conflict, and that they are useful but only if we accept that they are all bound to fail.

What, then, of the notion of the Utopian Nurse? How do their utopian failures become acceptable? How can nurses perform imperfection? In current political climate of the United Kingdom, the performance of the perfect nurse is one that subsumes his/herself to the will of the institutional agendas that do not serve them. How can this be resisted? Can the performance of imperfection offer some kind of resistance to the forces of measurement and accountability that demand certain forms of perfection?

Out of the discussion of the possibility of the Utopian nurse, *The Secret Society of Imperfect Nurses* was instigated. The work offered a structure that arrived from a lineage of proto-organisations, or "mockstitutions" (Sholette, 2010, 2015), but also held the potential to become a real organisation. The work made a space to explore the expectations and limitations of being a professional carer in today's NHS, as well as a wider reflection about the notion of the perceived utopia of the Healthcare system, in general.

Complex temporalities were at work in how the industrial dispute was being fought and engineered through various avenues of public discourse. The NHS was established, one

academic argues, "as a utopian enclave prefiguring an idealised non-capitalist future" (Harrington, 2009). Market forces were/are threatening to penetrate this once protected space, an activist nurse contends on twitter: "The NHS nursing workforce crisis will be solved by investment, not by looking backwards with rose tinted nostalgia" (Tiplady, 2019).

The Society met in a basement bar, (a private members drinking club for medics) repurposing a corner and constructing a new function from it. Anonymous cards were used to draw in members. The creation of fake names created a "secret" atmosphere that utilised aesthetics of underground, resistance movements not usually associated with healthcare. It was a clandestine space to admit one's flaws, to critique others, and to analyse the systems that demanded the impossible. The work offered a way to perform that was counter to the expected role of a nurse. It was a movement against perfection.

The aesthetic conceit of resistance was aligned with Chantal Mouffe's notion of agonism in that it was an artistic space that did not attempt to totally reject the ideas of the perfect nurse, but rather provide a space to explore what that notion of what that idea means. Mouffe writes:

> *Those [artists] who advocate the creation of agonistic public spaces where the objective is to unveil everything that is repressed by the dominant consensus are going to envisage a relation between artistic practices and their public in a very different way than those whose objective is the creation of consensus – even if that consensus is considered critical consensus. According to the agonistic approach, critical art is art that forms a dissensus – that makes visible what the dominant consensus tends to obscure and obliterate, aiming to give voice within the existing hegemony (Mouffe, 2007).*

The intention of an agonist intervention within the public space is not to make a total break with the existing order and suggest an alternative political utopia, but to subvert that order, and provide new subjectivities. In other words, it is art's role to provide a "potential for transformation," rather than be a political act that guides the transformation itself. *The Secret Society* was therefore a productive space for student nurses to find points of contact and resistance and did not aim to fix perfection and replace it with another ideal, but rather provide a moment of resistance from which new potentialities could develop. As an artistic space, rather than a pedagogical or political group, the imagining of other possibilities provided gaps within the armour of perfection (as well as the assumptions of imperfection as "failure"). As has been suggested: "art is a wonderful place where you can reflect on the failures(s) of utopia" (Bishop and Groys, 2009).

Hailing from the tradition of institutional critique, Gerald Raunig's term "instituting" offers a useful institutionally inflected form of agonism. He describes "a site of productive tension between a new articulation of critique and the attempt to arrive at a notion of 'instituting' after traditional notions of institutions have begun to break down" (Raunig and Ray, 2009). He describes practices that are still geared toward critique but offer an actualisation of a future, "a process and concatenation of instituent events." This exceeds mere opposition to institutions: it is not leaving the institution but "fleeing" institutionalisation. Raunig and Ray (2009) suggests that the "specific competencies of art can be deployed to spur on a general reflection on the problems of institutions, the predicaments of critique and the openings for new 'instituent' practices."

Raunig and Ray revisit the forms of artistic institutional critique from the 70s and 80s and note that the 80s practitioners (Andrea Fraser, in particular) articulated a conviction that it was impossible to function, be legible or effective outside of the art institution. By contrast they see contemporary "figures of flight, of dropping out, of betrayal, of desertion, of exodus" (Raunig and Ray, 2009), as a refusal of cynical invocation of hopelessness (such as "there is no alternative" first asserted in the 1980s by the Thatcher government). Here, Schrag's coming together in the name of imperfection offers a similar kind of mechanism; it maintains a commitment to organising together, but around a different set of values.

To return to the challenge then, outlined at the beginning of this paper, it is useful to think about both the time and space of *The Secret Society of Imperfect Nurses*, in relation to Raw et al.'s interest in the spaces created by arts-in-health as "sanctuary or suspended space" (Raw et al., 2012). It would be absurd to consider Schrag's *Society* as a sanctuary, a term as pious as the perfect nurse the society worked to debunk. However, the space of the *Imperfect Nurses* (and the performances therein) does mark a type of temporal suspension that exists in and without the institution.

Once Schrag was no longer leading the *Secret Society*, we assume it ceased to exist, but we don't know. Possibly one "successful" outcome of the project might have been that the institution attempted to "institute" it, recognising that, ironically, the process might make the students become better nurses (luckily this didn't happen!) It is also possible that the group continues, led by student nurses. While on one hand, this might reflect a genuine agency for the project, this would equally make it easily co-opted into institutional narratives of successful social engagement and impact.

Maybe the *Society's* transformation of space and thought continues through here-say and myth, or maybe it has vanished into the ether. We will never know where or when the para-world that the work constructed begins and ends. While there was some pressure to evidence or account for the healthcare student's engagement, Schrag made no aspect of the society visible for public exhibition. Partly this was because to make it visible would have undermined its secretive and mythic status, and also because these very performances of visibility and accountability were part of what Schrag and the society were working to disavow. Agonistic re-imagining is not intended to be productive to the institutions it critiques. Instead, it is intended to "makes visible what the dominant consensus tends to obscure and obliterate" (Mouffe, 2007).

HIDING IN PLAIN SIGHT

Becky Shaw was invited to work with a group of healthcare practitioners who were undertaking doctorates. They described doing a doctorate as a tactic to change their status, enabling

their work to be legible as knowledge, so they had greater agency and influence to change a system they knew, inside out, as practitioners. The problem of their transitional, uncertain identity and how they belonged in institutional space became the starting point for the work.

This group of students were articulate and aware; doubtful, cynical and curious about the value of any art process. They were uncertain whether this was education, community engagement or art and questioned who the project might serve. Rather than seek to clarify or resolve this tension, in the name of comfort or keeping the group engaged, Shaw worked to enable the group to explore this. The conversation began at Florence Nightingale Museum, by talking about the spatial transition from practitioner to researcher. Nurse Matt Alder likened his "in-between" position to the precise definition of utopia, a "no-place." The group talked about how, as healthcare practitioners, their time, role and mode of occupying space was fixed, but doing a doctorate produces an uneasy structure and a discomfort about what it means to "look busy" in un-programmed time. This entailed them having to learn how to occupy different spaces and having uncertain affiliations to their community. Many of them continued to work in their professional roles, either as research contexts or to maintain professional skills. The double role caused great anxiety and pressure.

Shaw noticed how many times forms of visibility – seeing and appearing – haunted conversations with the group. The group talked about the powerful and unravelling effect of witnessing death and trauma, alongside scientific and legalistic regimes of observation, such as the midwifery requirement to keep birth records for twenty-one years. They also talked about the reality of patient-staff and researcher-subject relationships as contingent, intimate, blended, often not adhering to the simplistic managed discrete separation deemed "professional."

Williams negotiated access to a Simulation and Interactive Learning (SaIL) Centre – a mocked-up ward environment that could be booked by staff. Like the *Are you Feeling Better?* commission, the SaIL Centre squeezed together education, learning and healthcare practice in one space. The group were encouraged to explore the material nature of the space and their relationship to it- a space that they never get to attend to or "see": when using it students must "believe" it is a real ward, rather than attending to its fictional status. Shaw invited the group to use bridge cameras as instruments to "look" with. They looked under and over furniture, closely at the weave of blankets, they looked at the patients' angle of view from the bed and they unpacked and laid out the emergency crash kit – a routinely repeated, fundamental part of critical care training. The well-worn ideal of moving research from "bench-side to bedside" (a mantra about bringing research straight from the lab to the patient) became an ironic joke as furniture was literally moved around. The experience of engaging with the material of the ward – and the conversations about visibility – coalesced into a decision to play hide and seek: a kind of material experiment with appearing and disappearing. An awareness of the way participants are represented photographically in social practice (the smiling, successful group), education (the successful achievers) and research projects (the research subject) generated a refusal to simply represent the gameplay.

Instead, representation and photography were understood as part of the logic of the game. The Seeker had to seek with a digital camera, their goal to catch an image of the Hider, while the Hider wore sound recording equipment to "catch" their silence. The 2 hrs of play involved furniture sliding across the room, gasping bodies trying to hold breath, bodies falling out of cramped positions and explosive laughter of discovery. A plastic patient dummy lying in bed heaved with laughter as a Seeker crept nearer the Hider, hidden underneath the dummy. A Hider wrapped up in hospital cellular blankets withdrew deeper into the ward curtains, like a snail, as the Seeker's outstretched hand clutched at something that seemed part hair, curtain and blanket. The footage contains strange round dark forms, not recognisable as bodies, twitching blankets, and askance angles down sides of beds. Rhythms of suppression and constraint and eruption and outburst marked the physical encounter.

After the gameplay, the group were invited to read Walter Benjamin's text, *A Child Hiding* (Benjamin, 1928) together, as a tool to think about the game in relationship to their working lives. Moving round the space, the group noted that the visible relationship between skin, bodies and the material of the ward started to be much less distinct and all of it became a kind of animate skin. Benjamin describes this as being enclosed in matter or even becoming part of matter – "behind door he is himself door" (Benjamin, 1928).

Benjamin writes about how being found can "petrify" the Hider, weaving him "forever as a ghost in the curtain," banished for life "into the heavy door" (Benjamin, 1928: 74). The group reflected on the possibility that on one hand hiding might mean that they were forever fused and petrified into the institution, or it might offer an escape from the "performance" of the institution. They saw this possibility as a desirable state of reverie or an escape, an exit from the pressure of performance. Like Schrag's *Secret Society* the Hiders are embedded in the institution, but there is also a sense of a line of flight, an exit, from a particular form of the institution and the institutional.

The group also reflected on what was left after the hiding game has taken place. Together they read the part of the text where Benjamin talks about the spaces left after children collect Easter eggs and likened it to the impact of their own hiding, saying, "It's like a body shape has been left in the place. By hiding in this space you have made a black hole, a new negative space" (Participant, *Hiding in Plain Sight* 2016). This phrase was unexpected and peculiar, suggesting that they had exited but also that they leave a type of dark matter. This drew verbal connections with Sholette's (2010) "dark matter" metaphor for invisible labour that supports the construction of other people's more visible roles. The parallels with Schrag's *Secret Society* are also apparent: the perfect nurse is an unending, invisible service for others. Schrag's *Imperfect Nurses* lurk in dark spaces, the *Secret Society* making visible a disavowal of visibility.

The use of the term "black hole" also enabled reflection on the effect of temporary, speculative works (or maybe all works)

after they have gone. Like Schrag's *Secret Society*, Shaw's *Hiding*, leaves material and structures unchanged but leaves an affect, or charge, that might change how the space feels afterward for those who made it. These are the kinds of "impacts" that rarely register in institutional contexts, though they may be more profound and affecting than any metric or body count. Too often, assessments are burdened by the desire to grow an audience separate to the shared process of making the event happen between those actors already present, alive to what they can make happen together.

THE BOOKLET: OUTCOMES AS EVIDENCE

In the subsequent booklet Williams developed and edited for inclusion in the *Paths to Utopia* exhibition, she proposes that the projects took place in a "fugitive space" (Williams, 2016). She asked project participants to reflect and write about what it was like to work with the artists on these projects. In response to *Hiding*, members of the group thought the process made a space "between being and doing" and a "revolutionary" and "emergent" means to "explore (literally and figuratively) environments in a new way" (Participants, *Hiding in Plain Sight* 2016). For another participant, Jennifer Jackson, the project also offered a way to "reconcile realities and utopias" through thinking about action, process and role:

> *"Inevitably, there is a distance between utopian practice and real-life practice. In this project, we aimed to inhabit and explore that space, to understand the gap in a tangible way" (Jackson, 2016 Participant, Hiding in Plain Sight 2016).*

Another – Mavis Machirori – saw the project as connected to an historic, anthropological process of defamiliarisation to "make the familiar alien in order to understand systems, processes and structures around us" (Machirori, 2016 Participant, *Hiding in Plain Sight* 2016). In her conception, the indeterminate "space" of the work reflected on the ambiguous "felt" realities of moving between types of professional performance.

For his part, Schrag's project was also covered in the booklet by way of his own written text which sat alongside one by Tim Owen Jones, a participating nurse. For the subsequent film output, an off-spin of the project was devised in the form of *The Song of the Compassionate Robots*. This composite text – developed out of discussion at *The Secret Society* – was edited by Schrag and Made into an animation by artist John Harmer. It provided an engaging and accessible translation, but not a representation of the work. One might view it as something of stoodge or stand-in by-product: one, funny and lightweight enough to conform to the demand to "share findings in an imaginative and accessible way" (Bull, 2018) but without "shedding light" on the elusive dark space of *The Secret Society*. Its' production certainly demonstrated that the deep and more risky and serious material generated by *The Secret Society* could be spun in more than one kind of way. But one can view *The Secret Society* itself as an absence in this context – one that took a deliberate line of flight away from the institutionally presentable products.

Williams' inclusion of long texts written by participants themselves sought to capture a more complicated and committed process than simply learning outcomes or demonstrating "engagement." The booklet marked an attempt to capture these fluid processes and associated insights. It represented an alternative approach to the existing pedagogies already in place at the healthcare school. These taught medical students to appreciate The Arts and Humanities through discussion of set-texts, delivered as part of a teaching module. Such approaches are able provide pre-determined "learning outcomes against which to measure success" (Dunton and Williams, 2016).

Such bracing, pre-determined assessment criteria dictated whether pilot projects were "worthy of future development and resource" (Participants, *Are You Feeling Better?* 2016). Despite the best efforts of the Learning Manager to show appreciation for the alternative forms of pedagogy offered by *Are you Feeling Better?* it was a test that, not altogether unsurprisingly, the programme failed to achieve. The final booklet sought to engineer some visibility so that the conversations could stick around long enough for the works to have some affect outside the communities that created them. While the capacity to create a kind of visibility might be yearned for, it's also important to note that these projects that centre on experience and non-availability might also be construed as forms of cultural elitism, as Alex Farquarson notes.

> *If "new institutionalism" cannot create these publics, it will remain an ambitious prototype, as hermetically sealed as the white cube it shrugs off (Farquharson, 2006).*

The project was not deeply embedded enough in the institution for it to be recognised as part of KCL's data or outputs. Any wider production around potential publics ran into the buffers of diminishing resource, budgetary and human exhaustion alike. The publication, *Are You Feeling Better?* did not find a platform on the KCL website. But a later publication produced the following year similarly documented Arts in Health projects commissioned through the Cultural Institute (Arts in Mind King's College London [KCL], 2018). Although this festival drew on the similar intention as *Are You Feeling Better?* – i.e., the engagement of more healthcare students in the arts – the artist projects developed this time around were more emphatically used to prop-up the edifice of the organisations' narration of its own "success." A prominently placed quote from one participant has been placed at the front of the report. Described as "audience feedback" (Arts in Mind King's College London [KCL], 2018), it highlights, perhaps, the collapse of art education into forms of advertisement, advocacy and performance:

> *I am a fifth year medic interested in psychiatry and neuroscience. Hearing about the psychiatric topics from all these different perspectives helps me set goals regarding the ideal standards I want to achieve in my career (Arts in Mind King's College London [KCL], 2018).*

This awkward attempt to make audiences and types of publics both within the University and outside seems to be a particularly prevalent malady. Alan Read (et al), drawing on Bill Readings' *The University in Ruins* and Maurice Merleau-Ponty's lecture series *Institution and Passivity* delivers a damning analysis of the failure of education. To do this he explores what it means to "institute": "a process of social formation, *a temporarily protracted development to endow experience with durable dimensions*" (Read et al., 2015). He explores how the University was instituted as a form for the nation-state, expressing an ideology of a shared community of difference. Most relevant to both artworks mentioned above, Read asserts the significance of dissonance as a process that resists easy institutionalisation, at the same time as operating to "increase the efficacy of the instituting process." Schrag and Shaw's work both performs this same uneasy instituting – making a new one, resisting the existing one, but at the same time recognising the value of dissonance, or agonism to better the existing one.

CONCLUSION

Are you Feeling Better? and the two performative works explored here were born in an entangled (we might say *enstrangled*) landscape of desires and agendas that vie for centre stage: engagement, education, art and science and art and health. This mess is not novel or unusual but is perhaps just one rather complicated example, plucked from a familiar environment for contemporary commissioning in the United Kingdom. In developing art and health projects it is usual to iron away this complexity, conjuring into life clear and "perimetered" understandings of what is art, what is healthcare and what space constitutes the site for/of art.

The two projects attempt to live in this over-heated sea, but also to make the pressures part of the logic of the work. At the same time though both seek to make forms of "space" that offer a portal to another space, a parallel world with a slightly different climate. These spaces were different, wider, than the limited physical "space" of the show (where the work goes), the space of interaction (where engagement takes place) and affective space (the intended outcomes) that had been allocated by the commissioning context. Hybrid mutations of the actual institution were constructed, out of which new settings for performance became possible.

The works' refusal to perform in the designated space allowed them, we would argue, to over-reach the "surface" ambition set for their limited success. Schrag's *Secret Society of Imperfect Nurses* went underground, inhabiting the shadows. Perhaps it formed a parallel world, fed by feelings of personal failure, created by the relentless rhetoric of success patrolled by the institution. Likewise, Shaw's work *Hiding in Plain Sight* literally burrows down into the material form of the institution, finding a type of escape from visibility on the surface.

It is interesting then, to return to the works and consider how they relate to an arts and health agenda that seeks different kinds of space. Arts and Health practices do not take place within some weightless, abstract nowhere, but are shaped by heavily weighed histories and sets of agendas that are performed within particular social and political contexts. Many of these institutions present complicated backdrops, stages and directions, alongside all-too-contemporary financial pressures demanding efficient uses of time, space and resource. Such combined forces strangle many Arts in Health project at birth or squeeze spaces of activity so narrowly that only the pre-conceived, the censored, the literal and the over-rehearsed can eek through. This institutional frame is rarely appraised or acknowledged in Arts in Health research.

Challenges to this disciplinary logic are now mounting and come from many corners of these intersecting disciplines. One comes from academics working with the Medical Humanities who have written on the (fraught) experience of working in creative partnerships as part of the current vogue for the inter-disciplinary. This is a concept which they comprehensively explore and critique in their work (Callard and Fitzgerald, 2016). They suggest that:

> *one might approach a healthcare "institution" not as a conceptual and physical edifice whose histories we have become used to tracing (the National Health Service, the World Health Organisation, the hospital), but as something that gives form or order precisely by "cutting" or "disentangling" entities from a heterogeneous field (Callard and Fitzgerald, 2016: 42).*

The two projects we created, creatively engaged with some of the enstranglements and structural apparatus within which we had to find a place for the work (and ourselves). Those leading the charge for Critical Medical Humanities propose their own entangled field as one that has been constituted through forms of "intra-action" rather than "inter-action" (Barad, 2003). Using a provocative metaphor of cultural exchange, as a financial transaction, they assert that:

> *We do not, as scholars from various disciplines, bring our objects and practices to another through a kind of free-trade agreement; rather we re-enter a long history of binding, tangling and cutting, within which current moves towards integration are much more weighted than they might at first seem (Callard and Fitzgerald, 2016: 39. Emphasis added).*

Such descriptions of the complex processes whereby exchanges of value and knowledge take place, rightly undermine the easy assertions, made by leaders at KCL, that the institution has long supported research into the "symbiosis between arts and health" (Utopia 2016 website, 2016) as though these separate entities are somehow self-evident and fixed, and not created through exactly the kind of thick, dense, accumulated processes and layerings of power, described above.

Critical reappraisals of Arts-Health practices and their conditions of production might further sit within broader accounts of the "health of critique" more broadly (Fassin, 2019). In a paper which asks the question, "How is critique?", he playfully asks the reader to indulge him in giving a "medical bulletin," if obviously one given "with a grain of salt." (Spoiler: the news is not good!).

His main point is that "it is indispensable to contextualise critique both temporally and spatially," making the point that "we must count for both dimensions" (Fassin, 2019: 14). He identifies

how over the last half a century critique "has lost much of its radical edge and academic legitimacy, while being increasingly confined to marginal circles," charting various contexts and places within which particular discourses rose and fell, (not least that of the "backlash" that began in the late 1970s when "the repressive neoliberal turn" began to take hold in the United States and United Kingdom). Thus, he concludes:

> *The way in which research programs and scholars are currently promoted, funded, and assessed in institutions of higher education is a recent importation from the corporate world that has substantial effects on the production of knowledge. Not only can critique not ignore the structuring and interconnecting of these social spaces, but it is entirely embedded and shaped by them, even when it criticises them (Fassin, 2019: 21).*

While this may not be the place to further expand on the place and times of critique within which the formations of Arts-Health have sat (and sit), we believe the examples of practice detailed above point to productive points of specific constraint - pressures strongly informed by their time and place. As such, these specific examples bring wider applicable lessons in terms of how they relate to broader trends, directions and political economies that make visible "Arts-Health" as a useful category of thought and action, practice and research.

To conclude then, the opportunity to retrospectively write about these two projects in this journal has come as a welcome opportunity to revisit the site of a disappearance whose lessons have clung to those involved (if not the host body). Without the "space" in this journal to develop these afterthoughts, the trails described above might have gone entirely cold. The role of KCL in the field of Arts in Health, also continues to evolve – and expand – with many re-brandings and internal re-structurings made over the last 5 years, positioning an "arts enhanced health education" alongside a dedicated *Arts, Health and Well-being Hub* charged with "raising the university's profile in this area, as leader, convenor, partner and participant." As part of fresh conversations around the performance of Arts in Health in higher education, we hope the projects we describe here can challenge or spook future possibilities, suggest alternative forms of critical appraisals, and provide timely hauntings from lost pasts (7671).

ETHICS STATEMENT

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

SYSTEMATIC REVIEW
published: 11 January 2022
doi: 10.3389/fpsyg.2021.732246

Through the Looking Glass: A Scoping Review of Cinema and Video Therapy

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Background: Cinematherapy and video treatments are artistic therapeutic techniques by which the individuals are exposed to their psycho-physical difficulties through the stories of the characters on the screen who are coping with the same issues that the patients are. Although these techniques are increasingly common within modern art therapies, there are neither comprehensive classifications of the different approaches nor agreement on their effectiveness. We performed a scoping review, describing different methodological approaches and outcome measures in cinematherapy and video treatments.

Methodology: We searched articles in PubMed, PsycINFO and Google Scholar. We included: (i) articles in which subjects were treated for their difficulties with videos or films, (ii) articles written in English. Review articles and papers describing a research protocol without data collection were not included.

Results: We analyzed 38 studies. Thirty-six reported a positive effect of the treatment. Seven studies used classical cinematherapy, adopting a qualitative approach to measure the therapy outcome. Thirty-one studies used different video treatments, 8 of which were defined as randomized controlled trials with specific objective therapy outcomes. Studies were mainly focused on behavioral and psychological difficulties in Autism Spectrum Disorders and Schizophrenia.

Conclusion: Studies using video treatments more often rely upon structured experimental designs; on the contrary, those who used classical cinematherapy produced descriptive results. A more standardized methodological approach in terms of experimental design, procedure, and objective outcome measure is needed to provide evidence on the effectiveness of these techniques, promoting its application in the clinical field.

Keywords: cinematherapy, video modeling, video peer-modeling, video therapy, art therapy

OPEN ACCESS

Edited by:
Michael Koon Boon Tan, Sheffield Hallam University, United Kingdom

Reviewed by:
Steffen Moritz, University of Hamburg, Germany
Luis Calmeiro, Abertay University, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *28 June 2021*
Accepted: *01 December 2021*
Published: *11 January 2022*

Citation:
Sacilotto E, Salvato G, Villa F, Salvi F and Bottini G (2022) Through the Looking Glass: A Scoping Review of Cinema and Video Therapy. Front. Psychol. 12:732246. doi: 10.3389/fpsyg.2021.732246

INTRODUCTION

Cinematherapy and video treatments are artistic therapeutic techniques in which patients are exposed to complex audiovisual material displaying their psychological or physical difficulties. In the case of cinematherapy, commercial films are used, while in the video treatments, *ad hoc* created videos or brief documentaries are administered to the subjects. Focusing on the patients' difficulties, the film or video presentation aims to comprehensively understand them through a "third-person" perspective (Berg-Cross et al., 1990). The characters on the screen face the same problems as the patients and offer new ways to cope with them. Such an approach encourages patients to consider their difficulties from a different perspective (Sharp et al., 2002). Typically, the therapist chooses commercial films for an individual to view alone or with specified others. The patient and the therapist look at "reality" with the same magnifying glass by watching a film. This approach also helps strengthen the therapeutic alliance: the therapists' objective is to allow patients to recognize themselves in one of the characters; thus, they will better understand their emotions and, at the same time, realize their therapists have comprehended their difficulties. Therefore, therapists can better talk about patients' situations because they have created a "common vocabulary" (Berg-Cross et al., 1990).

Cinematherapy and video treatments originate from bibliotherapy, in which book plots are used with therapeutic aims. These techniques have become increasingly popular with the advent of VHS players, more and more replacing reading books with watching films for therapeutic purposes. Indeed, the use of films or videos is thought to be more "incisive and immediate" (Berg-Cross et al., 1990). One of the first scientific studies on clinical populations dates back to 1974. The authors used videos to treat specific phobias (Morris et al., 1974). Berg-Cross et al. (1990) described the cinematherapy technique providing some guidelines for its clinical application. Later, Heston and Kottman (1997) reported two descriptive cases of patients with depressive disorder treated with cinematherapy. Although using qualitative approaches, these early studies offered promising results, paving the way for other authors to approach the topic more objectively.

Over the years, several authors have also proposed different models of functioning with distinct phases for these techniques. For instance, Dermer and Hutchings (2000) have identified three stages in cinematherapy: (i) *Assessment*, in which the therapist or the counselor identifies the patient's problems and objectives and chooses films that, in their opinion, fulfill the therapeutic purpose but are also enjoyable to the patient; (ii) *Implementation*, which means that the therapist assigns a film to the patient to let them understand why the therapist has explicitly chosen that film; and then (iii) *Debriefing*, the session after viewing the film for understanding the patient's reactions. At this stage, the therapist and the patient link the film and the patient's history (making the cinematherapy effective). Brainstorming is also encouraged to make the patient reflect on what can be therapeutic in the film.

Other authors postulated four main stages for cinematherapy: (i) *Identification,* in which the patient identifies with the character because of the character's behavior and goals, becoming aware of the character's feelings and emotions; (ii) *Catharsis*, the patient tries to learn through the character's experiences; (iii) *Insight*, in which the patient internalizes the character's experience and creates a connection between the character's and their experience to become aware of their situation. A further stage was also identified (Jeon, 1992) that is *universalization,* in which the patient does not feel alone because they are watching the character's story and thus understand how similar they are to the character. This multistage process helps patients act positively toward difficulties in improving problem-solving strategies (Stamps, 2003). In other words, cinematherapy attempts to promote self-exploration and change by using film metaphorically (Berg-Cross et al., 1990).

Using cinema in clinical practice can allow patients to externalize their problems in a less formal context and discuss their problems in a more detached way to overcome their resistance to the therapy (Dermer and Hutchings, 2000). In such a process, emotions and emotional interaction play a pivotal role. One of the main features of the emotional interaction between the seen and the felt is the metaphor (Heston and Kottman, 1997). The film not only has to deal with the patients' problems clearly to let them create a link with their lives, but it also has to deal with them obscurely so as not to cause resistance that can interfere with the therapy. Consequently, the film must not describe the situation literally; instead, it must do so metaphorically. It generates a triadic relationship between the patient, the therapist, and the film. At this point, a link between the patient's situation and the situation represented in the film must be created to let the plot enter the patient's life. Such a metaphor may work on three distinct levels: (i) the literal plot of the film; (ii) the general metaphor beyond the literal plot; and (iii) the patient's metaphor, in which the film acquires a special meaning based on the patient's experiences (Heston and Kottman, 1997). Heston and Kottman (1997) helped a woman who had a troubled relationship with her mother by using the film "Lost in Yonkers." In this specific case, the first level is represented by the literal plot of the film (the story of the two boys who spend the holidays with their grandmother), the second level is represented by the general metaphor (the relationship of a mother with adult children). The third level is the one that represents the patient's metaphor, the meanings and personal connections that she can find with her own story. When talking about her feelings about the movie, the patient described her experience as follows: *"I was too much like watching my own family [. . .]."*

If, on the one hand, in cinematherapy, commercial films are used as treatment, on the other hand, some researchers create experimental designs using *ad hoc* created videos or documentaries in which some actors show skills of interest to the patient's case. This technique, called "video modeling," originated from Bandura's work (Bandura, 1986). Children naturally imitate social and cultural models to learn skills of interest independent of reinforcement. They can also practice the behavior they have learned in different situations because they have created general schemas to follow. In this process, attention plays an important role: if the subject does not pay sufficient attention to the model, or if the model is not attractive enough, the learning process could be unsuccessful. Moreover, the most

salient parts of the process should significantly impact the subject (Taylor and Fiske, 1978; McArthur, 1981). This discovery has led to the creation of videos that show important skills for patients. This technique is typically used with individuals affected by Autism Spectrum Disorder (ASD) and related social difficulties (Walsh et al., 2018), but it can also be used to treat different kinds of pathologies, such as phobias (Morris et al., 1974). The types of video modeling will be explained later in this article.

Cinematherapy and video modeling have been applied in several pathologies, such as Anorexia (Gramaglia et al., 2011), anxiety (Lee et al., 1983), and ASD (Golan et al., 2010; Isong et al., 2014). Many approaches have been used, ranging from traditional cinematherapy (Heston and Kottman, 1997) to *ad hoc*–created video stimuli and documentaries (Brown et al., 2016). Notably, most therapists/researchers do not apply standard criteria to use video stimuli in their studies. They instead adopt an *ad hoc* paradigm or even *ad hoc* video stimuli, cartoons, or documentaries as needed (Golan et al., 2010; Isong et al., 2014), thus preventing any generalizability of the results. Furthermore, not all studies have confirmed their effectiveness. With such a puzzling background, the need for a review of cinema and video therapy is crucial.

Scoping Review Objectives

The objective of this scoping review is to map the body of literature, describing how researchers and therapists use films or videos to treat psychological/physical difficulties in clinical/subclinical populations and to provide a classification of methodological approaches and outcome measures for future standardization of these techniques.

Scoping Review Questions

- What is the difference between cinematherapy and video treatment?
- How many studies apply cinematherapy or video treatment to clinical/subclinical populations?
- What kinds of psychological/physical difficulties have been treated?
- What methodological approach has been used (e.g., study design)?
- What outcomes have been measured?
- Was the application of the technique effective?
- What are the major methodological limitations of the available studies?

METHODS

The review was conducted following the PRISMA guidelines for Scoping Review (Tricco et al., 2018). The review included the following four key phases: (i) formulation of the research questions, (ii) research of the effective keywords accordingly to our scope, (iii) selection of the relevant studies in the literature, (iv) relevant information extraction.

Information Sources and Search Strategy

Studies were selected by querying the following keywords in PubMed, PsycINFO and Google Scholar: "Cinematherapy" or "Cinema therapy" and "Mood" and "Emotion" on 18/10/2019, "Cinematherapy" or "Cinema therapy" and "Mood disorders" on 18/10/2019, "Cinematherapy" or "Cinema therapy" and "Psychiatric disorders" on 18/10/2019, "Cinema therapy" or "Cinema therapy" and "Emotions" and "Mood" and "Psychiatric disorders" on 30/10/2019, "Video peer modeling" and "Cinematherapy" and "Psychiatric disorders treatment" on 30/03/2020, "Video peer modeling" and "Psychiatric disorders treatment," on 30/03/2020, and "Video treatment" and "Video stimuli treatment" and "Psychiatric disease" on 30/03/2020.

Eligibility Criteria

Studies included in this scoping review met the following inclusion criteria: (i) research article type, (ii) use of complex visual stimuli including video, films, or documentaries; (iii) application of the techniques on psychological or physical difficulties; (iv) English language.

Information Extraction

To investigate the suitability of the article, we firstly evaluated the title, then the abstract, proceeding to the entire text. ES and GS agreed on the eligibility criteria of the selected studies. Information of interests such as the type of treatment, the treated pathology, study design, characteristics of the participants' sample and outcome have been extracted and reported in **Table 1**. No online protocol is available.

RESULTS

Through databases, 484 articles were identified, and after duplicates were removed, 453 articles were analyzed. After analyzing the content of 186 articles, 148 were excluded because they did not meet the inclusion criteria, such as studies in which cinema or videos were not used for therapeutic aims. Thirty-eight studies published from 1974 to 2018 comprised the final sample included in the review (**Figure 1**). Among studies included in this review, seven used classical cinematherapy (Turley and Derdeyn, 1990; Heston and Kottman, 1997; Bierman et al., 2003; Marsick, 2010; Gramaglia et al., 2011; Ballard, 2012; Eğeci and Gençöz, 2017), 9 used video modeling approach (Charlop and Milstein, 1989; Reeve et al., 2007; Scattone, 2008; Coughlin et al., 2009; Jones et al., 2014; Copple et al., 2015; Macpherson et al., 2015; von Maffei et al., 2015; Walsh et al., 2018), 5 applied video peer modeling (Morris et al., 1974; Muzekari, 1976; Corbett et al., 2011; Perlick et al., 2011; Brown et al., 2016), 1 used video self-modeling, (Wilkes et al., 2011), one combined video peer modeling and video self-modeling (Decker and Buggey, 2014). Eleven out of 38 studies used a generic video treatment (Lee et al., 1983; Gelkopf et al., 1993, 2006; Kimata, 2007, 2008; Golan et al., 2010; Lim, 2010; Marx et al., 2010; Olatunji et al., 2012; Savorani et al., 2013; Yan et al., 2018), 1 with video feedback (Thiemann and Goldstein, 2001), 1 with video prompting (Rayner, 2011), 1

TABLE 1 | Summary of the analyzed articles.

First author and year of publication	Type of treatment	Treated pathology	Study design	Participants	Outcome
Morris et al. (1974)	Video peer modeling	Snake phobia	Quantitative	*n* = 145 high school students divided into an experimental group (*n* = 66) and control group (*n* = 79).	Positive: The experimental group, compared to the control group, reported lower level of anxiety and avoidance of snakes, as well as a decrease in erroneous beliefs on the subject.
Muzekari (1976)	Video peer modeling	Schizophrenia	Quantitative	*n* = 45 chronic schizophrenic patients, divided into three groups: Experimental group A (Good model; *n* = 15), Experimental group B (Poor model; *n* = 15), Control group (No model; *n* = 15).	Positive: The experimental group that saw positive peer models improved over the controls that saw poor models or no models.
Lee et al. (1983)	Video treatment	Agoraphobia	Quantitative (Randomized control trial)	*n* = 32 Agoraphobic patients were randomly divided into three experimental groups and a control group (*n* = 8 for each group).	Positive: The "faded" group showed significant decreased phobic behavior than the controls and the supraliminal group. The improvement was maintained after 12 weeks.
Charlop and Milstein (1989)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Multiple baseline design)	*n* = 3 children with ASD, no control group.	Positive: Children learned new conversational skills from videos and generalized them to other situations as well. They kept the skills even 15 months apart.
Turley and Derdeyn (1990)	Classical cinematherapy	Violent behavior	Quantitative (Single case description)	*n* = 1 boy	Positive: Discussion with the therapist about the thoughts, concerns, and motives of the characters in the horror films allowed the boy access to his preconscious conflicts.
Gelkopf et al. (1993)	Video treatment	Schizophrenia	Quantitative	*n* = 34 patients with Schizophrenia were divided into an experimental group (Humorous movie, *n* = 17) and a control group (Other movies, *n* = 17)	Unclear: No significant improvement was reported by the two groups of patients. Nevertheless, the psychiatric staff reported a significant reduction in negative emotional states in the patient and an improvement in the degree of perceived staff support. Results may be due to an incidental positive effect on staff emotional state.
Heston and Kottman (1997)	Classical cinematherapy	Depression	Qualitative	*n* = 2 patients with depression. No control group.	Positive: Patients gained new insights about their condition and improved in therapy.
Thiemann and Goldstein (2001)	Video feedback	Autism spectrum disorder (ASD)	Quantitative (Multiple baseline design)	*n* = 15 children divided in ASD group (*n* = 5) and Neurotypical group (*n* = 10).	Positive: Children improved their conversation skills and generalized them to other contexts.
Bierman et al. (2003)	Classical cinematherapy	Different disorders concerning mood and behavior	Qualitative	*n* = 15 adolescent girls with different diagnoses. No control group.	Positive: The girls were able to relate to the films and successfully discuss them, improving their therapeutical process.
Gelkopf et al. (2006)	Video treatment	Schizophrenia	Quantitative (Comparative study)	*n* = 29 patients with Schizophrenia divided into one experimental group (*n* = 15) and a control group (*n* = 14).	Positive: Reduction of negative symptomatology, decrease in negative emotions and improvement in social skills.
Kimata (2007)	Video treatment	Atopic dermatitis and Night awakenings	Quantitative	*n* = 80 divided into *n* = 40 children with Atopic dermatitis and Night awakenings and *n* = 40 healthy children.	Positive: Humorous films decreased nocturnal awakenings and ghrelin levels in the saliva of children with dermatitis, while no significant effect is recorded for the healthy ones.
Reeve et al. (2007)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Multiple baselines across participant design)	*n* = 4 children with ASD. No control group.	Positive: Children learnt to address correct responses for helping behaviors and to generalize responses to other situations. They maintained the new skills after a 60 days follow-up.
Scattone (2008)	Video modeling	Asperger syndrome	Quantitative (Multiple baseline design, case study)	*n* = 1 adolescent with Asperger. No control group.	Positive: Improvement in 2 of the 3 target skills, as well as a generalization of the same skills

(Continued)

TABLE 1 | (Continued)

First author and year of publication	Type of treatment	Treated pathology	Study design	Participants	Outcome
Kimata (2008)	Video treatment	Atopic dermatitis and Erectile disfunction	Quantitative (Randomized controlled trial)	*n* = 36 men with atopic dermatitis suffering from erectile dysfunction divided into one group (*n* = 18 men watching humorous films first), another group (*n* = 18 men watching control films first)	Positive: When participants were exposed to humorous films, erectile dysfunctions diminished, testosterone increased, and estradiol levels decreased, while control films failed to obtain the same outcome.
Coughlin et al. (2009)	Video modeling	Behavioral problems	Quantitative (Controlled clinical trial)	*n* = 74 parents of children with behavioral problems divided into Enhanced video-based treatment group (*n* = 42); Treatment as usual (TAU) comparison group (*n* = 32).	Positive: Both immediately after the end of treatment and 5 months after treatment, the Parents Plus Children's Programme (PPCP) group decreased conduct problems and problems with peers (concerning children), then decreased parental distress and increased parental self-esteem. Parents' ability to define problems and goals has increased. Treatment is most effective for children who only have behavioral problems. The positive changes were maintained to a 5-months follow-up.
Golan et al. (2010)	Video treatment	Autism spectrum disorder (ASD)	Quantitative (Comparative study)	*n* = 56 children divided into an experimental group (*n* = 20 children with ASD administered with the video-based intervention), ASD control group (*n* = 18 children with ASD without video intervention), Normally developing children group (*n* = 18 neurotypical children)	Positive: Experimental subjects significantly improve their performance, reaching a performance comparable to both control groups.
Marsick (2010)	Classical cinematherapy	Parental divorce	Qualitative (Collective case study)	*n* = 3 children whose parents were divorcing. No control group.	Positive: The children were able to reflect better on the situation and increased their awareness of the situation.
Lim (2010)	Video treatment	Autism spectrum disorders (ASD)	Quantitative (Randomized controlled trial)	*n* = 50 children with ASD divided into a music condition group (*n* = 18), Speech condition group (*n* = 18), and Control group (*n* = 14)	Positive: Children in both the music and speech groups improved significantly in their speech, those with low functioning showed greater improvement after music training.
Marx et al. (2010)	Video treatment	Dementia	Quantitative	*n* = 56 patients with dementia. No control group	No effect: Patients can be positively engaged with dog-related stimuli, particularly with real dogs. No significant differences were found in engagement duration among our dog-related stimuli.
Corbett et al. (2011)	Video peer modeling	Autism spectrum disorder (ASD)	Quantitative (Pre-test-post-test design)	*n* = 8 children with ASD. No control group.	Positive: ASD participants showed an improvement in the Theory of Mind and face recognition.
Gramaglia et al. (2011)	Classical cinematherapy	Anorexia Nervosa	Qualitative (Single-case study)	*n* = 1 woman with binge-purging anorexia nervosa	Positive: The treatment increased the patient's awareness of her pathological condition and allowing a better tolerance of psychotherapy treatment, with positive repercussions on the patient's daily life
Perlick et al. (2011)	Video peer modeling	Schizophrenia	Quantitative (Randomized controlled trial)	*n* = 122 caregivers of patients with schizophrenia divided into a Peer-led intervention group (*n* = 59), and a Clinical-led intervention group (*n* = 63).	Positive: Caregivers receiving peer-led video-based intervention experienced marked improvement in self-stigma and secrecy.
Rayner (2011)	Video prompting	Autism spectrum disorder (ASD)	Quantitative (Case reports)	*n* = 3 children with ASD who attend to both video prompting and backword chaining technique.	Unclear: Although the video prompting interventions increased the number of steps in the shoelace tying task completed by each participant, the backward chaining procedure was more effective, enabling one participant to reach mastery and a second participant to approach mastery.

(Continued)

TABLE 1 | (Continued)

First author and year of publication	Type of treatment	Treated pathology	Study design	Participants	Outcome
Wilkes et al. (2011)	Video self-modeling	Attention deficit and Hyperactivity disorder	Quantitative	*n* = 28 children divided into an attention deficit and Hyperactivity disorder (ADHD) group (*n* = 14), and a Typical developing children group (*n* = 14).	Positive: Both children with ADHD and peers have improved their social play skills.
Ballard (2012)	Classical cinematherapy	Relationship problems	Qualitative (Case study)	A couple with relationship problems. No control group	Positive: The film helped participants become aware of the nature of their problems and speak positively about them.
Olatunji et al. (2012)	Video treatment	Blood-injection-injury phobia	Quantitative (Randomized controlled trial)	*n* = 44 subjects with blood-injection-injury phobia divided into an experimental condition group (*n* = 22 exposed to "disgusting" condition), and a Neutral condition group (*n* = 22 exposed to neutral videos).	Positive: The subjects who viewed the "disgust-condition" videos felt more disgust than those who saw the neutral videos. All the participants exposed to the videos with sampling images improved at the end of the treatment.
Savorani et al. (2013)	Video treatment	Dementia	Quantitative	*n* = 20 patients with dementia divided into an experimental group (*n* = 10 patients undergoing video-treatment), and a Control group (*n* = 10 patients with usual treatment).	Positive: There was a decrease in NPI scores and the distress levels of attendants and relatives.
Isong et al. (2014)	Video peer modeling and video treatment	Autism spectrum disorder (ASD)	Quantitative (Randomized controlled trial)	*n* = 69 children with ASD and dental fear divided into a video peer modeling only group (*n* = 17), Video goggles only group (*n* = 15), Video goggles plus video peer modeling only group (*n* = 18), and a Control group (*N* = 19).	Positive: The video goggles group and the peer modeling group plus video goggles have improved follow-up visits (4–6 months).
Jones et al. (2014)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Concurrent multiple baseline design)	*n* = 4 children with ASD.	Positive: Results suggested that certain irrelevant stimuli (adult vs. peer recipient) were more likely to exert stimulus control over responding than others (setting, materials) and that video viewing was an efficient way to promote generalization to peers.
Decker and Buggey (2014)	Video self-modeling vs. video peer modeling	Learning disabilities	Quantitative (Multiple baselines across participant design)	*n* = 9 children with learning disabilities divided into a video peer modeling group (*n* = 3), a Self-modeling group (*n* = 3), and a Control group (*n* = 3).	Positive: Both video self-modeling and video peer modeling make the children improve reading fluency. Positive effects were maintained at follow-up (6 weeks for the first group, 4 for the second and 2 for the third).
Macpherson et al. (2015)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Multiple baselines across participant design)	*n* = 5 Children with ASD. No control group.	Positive: Subjects increased the use of compliments and expanded the use of responses. These behaviors have also been generalized to other situations.
von Maffei et al. (2015)	Video modeling	Schizophrenia	Quantitative (Quasi-experimental pre-post design)	*n* = 113 patients with schizophrenia. No control group.	Positive: Subjects increase their knowledge of disease, insight, and improve for quality of life. The improvements could still be observed after a year.
Copple et al. (2015)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Single-subject multiple baseline design)	*n* = 3 Children with ASD or Autism symptoms. No control group.	Positive: All three participants demonstrated the ability to request preferred objects following the intervention and generalize the newly acquired behavior across stimuli and people.
Brown et al. (2016)	Video peer modeling	Smoking	Quantitative (Randomized controlled trial)	*n* = 3,019 smokers divided into no-intervention control group (*n* = 1,016), Informative intervention group (*n* = 1,004), and an experimental treatment group (*n* = 999).	No effect: There was no difference between the subjects undergoing the experimental treatment, the informative treatment, and those who did not receive any treatment.

(Continued)

TABLE 1 | (Continued)

First author and year of publication	Type of treatment	Treated pathology	Study design	Participants	Outcome
Eğeci and Gençöz (2017)	Classical cinematherapy	Relationship problems	Qualitative (Descriptive study)	*n* = 6 women with relationship problems. No control group.	Positive: the viewing step itself did not promote change; instead, the discussion phase induced new insights and facilitated the generalization of these gains into individuals' problem areas.
Walsh et al. (2018)	Video modeling	Autism spectrum disorder (ASD)	Quantitative (Multiple-probe design)	*n* = 7 young adults with ASD. No control group	Positive: Results showed significant increases in target social skills and a significant decrease in problem behaviors following the intervention. Evidence of maintenance and generalization was also demonstrated up to the 3-month follow-up.
Yan et al. (2018)	Video treatment	Autism spectrum disorder (ASD)	Quantitative	*n* = 21 children divided into an ASD group (*n* = 14 children with ASD), and a Control group (*n* = 7 typically developing children).	Positive: The intervention improved ASD children's emotion recognition compared to their pre-intervention scores.
Dueñas et al. (2019)	Video Joint modeling	Autism spectrum disorder (ASD)	Quantitative (Multiple Probe Cross participant design)	*n* = 6 children divided into a patient group (*n* = 3 children with ASD), and a control group (*n* = 3 typically developing children).	Positive: The participants improved unscripted verbalizations during pretend play with typically developing peers in an inclusive early childhood setting. Moreover, participants learned to use verbalizations even not included among those taught during the treatment, and these remained even in the absence of the video models.

with video peer modeling and a generic video treatment (Isong et al., 2014), and 1 with video joint modeling (Dueñas et al., 2019). Notably, 36 of the 38 studies reported a positive effect of the technique. All the articles applying classical cinematherapy can be classified as qualitative studies. In the case of video treatments, a quantitative approach has been mainly used. For a more detailed characterization of each study (see **Table 1**).

In the following paragraphs, we define cinematherapy and video techniques arising from the scoping review of the literature. We also summarized their features, such as the type of film stimuli used, the type of treatments applied, and the populations to which these treatments are administered.

Types of Treatment

In this section, we will summarize the most common ways to use films or videos to treat people (classical cinematherapy and video modeling), and we will show some examples of video treatment.

Traditional Cinematherapy

Traditional cinematherapy can be defined as a therapeutic technique in which the therapist selects commercial films and asks the client to see them alone or with specific other people (e.g., family members). In particular, the therapist chooses some films that, in their opinion, relate to the patient's difficulties and, after a viewing session, discusses with the patient the main themes that emerged from the movie. For example, Ballard (2012) showing *Shrek 2*, a cartoon in which a friend of the two protagonists impedes in their life as a couple, helped a couple become aware that the problems of their relationship were due to their intrusive parents and friends. Another interesting reflection is that viewing specific films can be effective, even when patients accidentally see them (Heston and Kottman, 1997). The therapist must find a film with the characteristics described above that matches the subject's preferences, goals, interests, and comprehension ability (Heston and Kottman, 1997). With this in mind, it is desirable to use films with content that the patient can endure; for example, showing a patient a film in which their problem is treated overly explicitly and traumatically can be counterproductive (Heston and Kottman, 1997). Moreover, if the patient is in a particular phase of therapy, such as working hard to change, the therapist should avoid cinematherapy (Berg-Cross et al., 1990).

Video Modeling

The video modeling technique exposes patients to videos in which characters manifest specific skills that the patients need to learn (e.g., learning how to interact with other people successfully). At the end of the video, the patients can practice what they learned from the character. It is also important to note that video modeling techniques are sometimes combined with other treatments (e.g., psychotherapy) (Corbett et al., 2011; Perlick et al., 2011).

In a clinical setting, video modeling has mainly been used to improve social skills in individuals affected by ASD, ranging from the appropriate behavior in a workplace environment (Walsh et al., 2018) to the ways of initiating and carrying on a social conversation during daily activities (Charlop and Milstein, 1989; Thiemann and Goldstein, 2001; Scattone, 2008; Dueñas et al., 2019), and from positive behavior when playing with peers (Macpherson et al., 2015) to helping behavior (Reeve et al., 2007).

Another application of video modeling exposes patients to videos of people recounting their experiences of a particular event (Perlick et al., 2011; Brown et al., 2016). For example, Brown et al. (2016) study screened a documentary that portrayed five smokers who shared their experiences in the first month of their successful attempts to stop smoking, day by day, like in a diary.

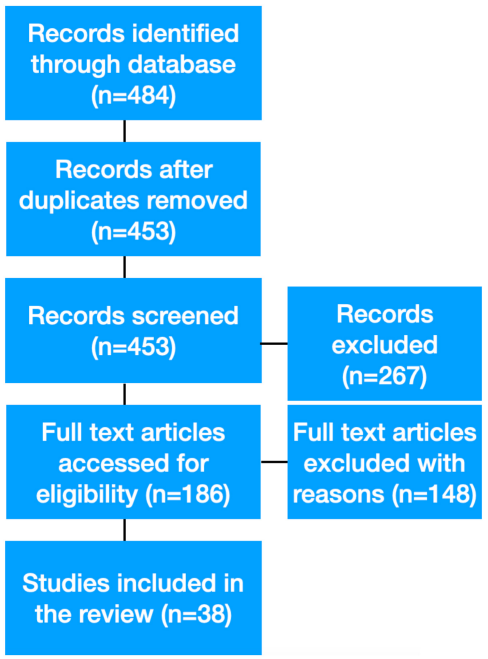

FIGURE 1 | The flow chart shows the selection process of the articles.

In addition to the above-presented general structure of video modeling, this technique can be employed in different ways using various labels. An example is *video prompting*, which provides a step-by-step learning experience. In video modeling, all the skill passages (e.g., tying shoelaces) are usually shown together and followed by the option to attempt the skill. Unlike typical video modeling, video prompting shows each section of the video separately so that the subject can try each step of the skill (Rayner, 2011). *Joint video modeling* pairs a joint exposition with a video, and the subject interacts with a peer without the target pathology and watches the same video while receiving the same treatment (Dueñas et al., 2019).

If the characters in the videos are the patient's peers, then the treatment is called *video peer–modeling*. This model shares particular patient features, such as age (Isong et al., 2014) or pathology (von Maffei et al., 2015; Brown et al., 2016). Watching the main character in the video offers a way of coping with difficulty because it encourages patients to adopt new strategies for their problems. For example, Morris et al. (1974) used four 12–min color films. The videos were categorized as experimental and control stimuli. Their content was as follows: (i) a student interacting with a female herpetologist and learning to manipulate snakes ranging from little ones in a cage to bigger ones in her hands (experimental) while a male narrator explains the scene and provides information about snakes; (ii) the same film except for an additional scene in which the protagonist lets the big snake winds around her neck (experimental); (iii) a snake moving in a cage (without any explanation), and (iv) some beautiful scenarios with no references to snakes.

Another variant of video modeling is *self–video modeling*, in which the target subject acts as a self-model instead of using an external model (an actor or a peer). The therapist video records every treatment session and follows up by showing these videos to the participant, who then reflects on the target behavior (Wilkes et al., 2011).

Video modeling is also used for developing psychological treatments. The Parents Plus Children Programme (Sharry and Fitzpatrick, 1998), for example, was created to help parents of children with behavioral problems. It consisted of videos of both excellent and inadequate management of problematic situations, and the characters were both real parents and actors. After viewing the film, the people who took part in the treatment discussed its contents. In 2009, Coughlin et al. (2009) retested the treatment on parents of children from 6 to 11 years old with and without other pathologies besides behavioral problems (for example, from ASD to learning or language problems) and found a decrease in behavioral problems, stress levels, with augmented trust, and parent-defined goal achievement. At a 5 months follow-up, the participants maintained these skills and showed an improvement in prosocial behavior.

Additional Use of Videos in Treatment

This paragraph includes some examples of other ways to use video or cinema to treat different pathologies. For instance, Lee et al. (1983) have treated patients with agoraphobia using specific manipulated videos that gradually expose patients to the target of their phobias. Patients were informed that the treatment consisted of watching films for 4 weeks and a follow-up after 3 months. Patients were assigned to one of four conditions in random order: (i) subliminal stimuli, (ii) supraliminal stimuli, (iii) faded stimuli, and (iv) control condition. Every subject in the subliminal vision, faded vision, and control conditions saw the stimuli, a spot of light varying in intensity, under the threshold level. In the faded condition, the filters were positioned so that the stimulus changed from entirely subliminal to entirely supraliminal. Accordingly, the experimental group saw stimuli concerning agoraphobia, and the control group saw films in which a man constructed a clay pot. Similarly, Olatunji et al. (2012) have studied the effect of habituation on Blood Injection Injury phobia through exposure to threatening videos.

In another setting, Kimata (2007, 2008) screened humorous films for patients affected by atopic dermatitis and other manifestations of this stress-related illness. In an initial study Kimata (2007) found a diminished level of ghrelin in the saliva of patients suffering from atopic dermatitis and frequent night awakening in children suffering from it. In a second study, the author (Kimata, 2008) demonstrated that this treatment might diminish estradiol levels and increase testosterone levels in men affected by atopic dermatitis and erectile dysfunction. According to the author, exposure to comic films can reduce stress effects and improve the symptoms of the pathology connected with it (Kimata, 2007, 2008).

Further applications of humorous films come from Glekopf's study (Gelkopf et al., 2006). The authors applied this technique to people affected by schizophrenia. The treatment consisted of daily exposure to comedies 5 days per week for 3 months. Results showed a reduction in patients' anxiety and depression levels. Nevertheless, the mere vision of the film is not enough to make the patient improve, so the therapist must use the "relaxation" created by the film for traditional psychological therapy, as we can see from the same author's study of 1993 (Gelkopf et al., 1993).

Cartoons are also effective for the video treatment. Golan et al. (2010) used a specific cartoon in which "repetitive vehicles," such as trains, were presented. The trains were depicted with a human face expressing 15 target emotions to teach children to recognize them. This study was conducted to train children with ASD to improve their ability to recognize emotions by looking at facial expressions. The study was also replicated by Yan et al. (2018).

Lastly, the music video, the speech video, and no treatment were compared to investigate the most effective method for improving the conversational skills of children with ASD (Lim, 2010). Results have shown that songs (containing specific keywords with a technique called Developmental Speech and Language Training Through Music created *ad hoc* and speech videos with the same content as the songs improved language skills in children with high functioning ASD. Children with low-functioning ASD, however, only benefited from music videos.

Outcome Measures

Different outcome measures have been employed to explore changes due to video exposure. Often, cinematherapy does not involve quantitative analysis (pre-post); researchers simply discuss the movie content with the patients during and after the session, sometimes in combination with qualitative questionnaires (Eğeci and Gençöz, 2017).

Psychological Tests

Outcomes are frequently measured using psychological tests. For example, Lee et al. (1983) study used psychological tests to assess phobias, avoidance behaviors, depression, panic attacks, and anxiety. Simultaneously, an external operator (ignoring that the subject was undergoing an experimental assessment) investigated the same themes by interviewing participants. Isong et al. (2014), study though, the Venham Anxiety and Behavioral Scale, a measure of anxiety and behavioral problems, was used at the end of the visits.

Biological Markers

Studies have also assessed physiological parameters according to their aims when participants suffer from an organic illness or when the phenomenon under consideration involves physical parameters. For instance, in a study assessing the effects of viewing humorous films on erectile dysfunction in patients with atopic dermatitis, Kimata (2008) collected serum testosterone and estradiol levels. In another study, Kimata (2007) collected the saliva of children with atopic dermatitis and measured ghrelin levels and night-awakening events.

The authors also measure physiological parameters if it is helpful to understand psychological changes, as is the case with anxiety. For example, Lee et al. (1983) conducted a study on agoraphobia using subliminal, supraliminal, and faded stimuli. Participants completed bodily symptoms ratings after each stimulus exposure (Tyrer and Lader, 1973) and mood (Bond and Lader, 1974) ratings. They were asked about muscular tension, heart rate, sweatiness, breathing difficulties, shaking, relaxation, and excitement. However, skin conductance, respiratory rate, and heart rate were measured during the film to obtain objective data.

Clinical Applications

Cinematherapy and video modeling can treat various psychological difficulties and particular conditions in healthy and pathological populations. For instance, Marsick's (2010), study children who experienced parental divorce increased their awareness of their feelings and the situation after watching films about separation and divorce. Specifically, the results showed that people preferred films specifically conceived for their ages and historical periods. In another study (Bierman et al., 2003), cinematherapy was used to treat young girls with legal and family problems, demonstrating enhanced compliance and cooperation as well as an understanding of their family problems.

Other examples of pathologies in which video modeling is applied are ASD (Charlop and Milstein, 1989; Lim, 2010; Isong et al., 2014; Copple et al., 2015; Macpherson et al., 2015), addiction (Brown et al., 2016), schizophrenia (Muzekari, 1976; von Maffei et al., 2015), anxiety (Morris et al., 1974), dementia (Marx et al., 2010; Savorani et al., 2013), and anorexia nervosa (Gramaglia et al., 2011). It is also used for caregivers (Perlick et al., 2011) and people with learning disabilities (Decker and Buggey, 2014).

DISCUSSION

Cinematherapy and video treatments can help people manage life challenges. Movies or videos can help develop new skills, increase awareness, and offer new ways of thinking about specific problems in various patient populations. Cinematherapy and video treatments are flexible: they can be applied in several modalities and are adaptable to diverse situations. Nevertheless, there are some critical concerns. In classical cinematherapy, the choice of viewing material is not standardized; it varies according to the therapist's beliefs and experience. Even if some therapists have proposed lists of films that can be utilized to treat different emotional difficulties (Berg-Cross et al., 1990), these simply remain as advice.

This scoping review found that 38 articles using classical cinematherapy and others employing video modeling (or its subcategories) or other forms of video treatment have been applied to clinical/subclinical populations. In most cases (14 studies), the video technique was applied to treat behavioral difficulties related to ASD. Interestingly, we also found five

studies that examined the effect of cinematherapy and video treatments in patients affected by Schizophrenia.

Authors who used video treatments or video modeling are more inclined to implement experimental designs; on the contrary, those who used classical cinematherapy produced descriptive studies. Indeed, 8 of the 38 studies were designed as randomized controlled trials and all involved video treatment as a technique. This finding could be intrinsic to the differential nature of cinematherapy and video treatments. On the one hand, cinematherapy uses video material that is strongly characterized by an artistic component and thus challenging to standardize; on the other hand, video treatment involves straightforward video material without artistic intent. When cinematherapists use a film, they manage a complex artistic medium to treat patients. Transforming this approach into a standardized paradigm is far from banal. In some cases, standardizing a specific protocol appears to be more of a limitation than a treatment improvement. Due to these methodological limitations, estimating the objective efficacy for cinematherapy is complex, and the results, therefore, remain mainly descriptive.

Another issue involves a possible bias on the outcome effect: 36 out of 38 studies reported that the treatment had a positive effect. Consequently, a positive-results bias should also be taken into account. In one study that showed the technique to be ineffective, the authors ran a randomized controlled trial exploring the possibility of helping people quit smoking through videos (Brown et al., 2016). Brown et al. (2016) administered an online documentary film to motivate quit attempts among smokers in the general population. In this study, participants were randomly exposed to one of the three conditions: no-intervention control (n = 1,016), an informational film (n = 1,004), or an *ad hoc* documentary (*4 Weeks2Freedom*) (n = 999). Results showed that there was no detectable effect of the intervention compared with the no-intervention control or informational control film. Among the possible causes of the negative result, the authors suggested that the film may not have been sufficiently engaging to keep participants viewing for long enough to have an effect. Furthermore, they stated that the intervention was unsuccessful as the identification process according to which viewers identify with the people in the *ad hoc* documentary might not have been effective. We also advise caution when using video modeling, as its efficacy may also depend on the choice of material. For instance, in some studies, videos with adult models were shown to children to improve their skills (Charlop and Milstein, 1989). However, Jones et al. (2014) found that when social skills were taught to children with ASD using adults as models, the children only applied the new competencies when interacting with other adults, not with peers. Finally, it is interesting to note that Isong et al. (2014) suggested that this treatment is effective only when combined with additional instruments (e.g., video peer modeling plus video goggles).

Another critical aspect of this technique is the pathology type for which it is applied. Whereas researchers use classical cinematherapy or video treatment for a large plethora of difficulties (from children with divorced parents to blood phobia), they more often successfully use video modeling to treat people with ASD (14 studies). As a result, we cannot have a global view of the actual efficacy of this technique for other kinds of pathologies. It would be interesting to apply it to different patient populations and other psychological/physical difficulties to analyze who can best benefit from the treatment.

The main criticism of using cinematherapy and video treatment is that they lack a standardized set of stimuli and protocols. Future studies should aim to create standardized protocols, above all in cinematherapy practice, for patient populations. It would be helpful to select a film or some particular scenes of a film and standardize them through an adequate number of healthy subjects who judge the emotional valence of the selected stimuli. Most importantly, the main outcome should be measured objectively. A rigorous methodological approach will allow for the scientific validation of these audiovisual techniques, which are easy to administer and flexible.

We have all been to the cinema and have relived the emotions we were experiencing through the characters in the film. This experience is a widespread testimony to the value of the technique. Nevertheless, its justification cannot remain purely anecdotal; further scientific validation is necessary.

Limitations

One of the limitations of this study concerns the detection of published papers on the topic. In fact, in some cases, studies on art therapy are published in journals that are not indexed in major search engines such as PubMed. For this reason, this review may not have taken these papers into account. To deal with this issue, we attempted through cross-searching to include all published works in which cinematherapy and video treatments were applied to clinical and subclinical populations. Lastly, because the review was limited to papers published in the English language, it is possible that other potentially relevant papers were omitted.

CONCLUSION

To conclude, the mapping of the published literature shows that a rigorous and robust methodology is not characteristic of diverse approaches, making the generalization of the results, if anything, more complicated. Cinematherapy and video treatments are flexible, easy-to-use approaches that can be applied to different patient populations. Although the application of stricter rules is complicated due to the complexity of the adopted stimuli, we believe that such an effort is desirable: implementing standard protocols with more precise efficacy indexes will make these treatments objectively valid rehabilitation tools.

SIGNIFICANCE STATEMENT

The art therapy landscape is vast and complex. In recent years, the application of cinematherapy and video modeling to treat psychological difficulties has increased enormously. Nevertheless, the methodological approach is mixed, and the outcome measures are mainly subjective. To our knowledge, this scoping review represents the first attempt to map the

available studies on cinematherapy and video treatment, with a twofold implication. First, it organizes what we know so far about cinematherapy and video treatment applied to clinical populations. On the other hand, it represents a starting point from which future research can improve protocols, increasing the efficacy of the use of these techniques at the intersection of art and psychology.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

ES: investigation, data curation, and writing—original draft. GS: conceptualization, writing—original draft, and writing—review and editing. FS and FV: writing—review and editing. GB: conceptualization, writing—review and editing, and supervision. All authors contributed to the article and approved the submitted version.

FUNDING

ES was supported by the Fondazione Don Carlo Gnocchi Onlus Cariplo Foundation and University of Pavia Scholarship.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

REVIEW
published: 09 February 2022
doi: 10.3389/fpsyg.2021.791773

Engaging the Arts for Wellbeing in the United States of America: A Scoping Review

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OPEN ACCESS

Edited by:
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Reviewed by:
Michael Koon Boon Tan, Sheffield Hallam University, United Kingdom
Hilary Bungay, Anglia Ruskin University, United Kingdom
Christina Davies, University of Western Australia, Australia

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *09 October 2021*
Accepted: *21 December 2021*
Published: *09 February 2022*

Citation:
Pesata V, Colverson A, Sonke J, Morgan-Daniel J, Schaefer N, Sams K, Carrion FM-E and Hanson S (2022) Engaging the Arts for Wellbeing in the United States of America: A Scoping Review. Front. Psychol. 12:791773. doi: 10.3389/fpsyg.2021.791773

There is increasing interest today in how the arts contribute to individual and community wellbeing. This scoping review identified and examined ways in which the arts have been used to address wellbeing in communities in the United States. The review examined 44 publications, with combined study populations representing a total of 5,080 research participants, including marginalized populations. It identified the types of artistic practices and interventions being conducted, research methods, and outcomes measured. It highlights positive associations found across a broad spectrum of psychological, physical, and social outcomes, including improvements in self-esteem and identity formation, cognition, physical balance, and physical conditioning. It also reports negative outcomes of arts interventions that may be underreported. The study identifies the need for core outcomes sets and reporting guidelines for advancing evidence synthesis in this area.

Keywords: arts in health, wellbeing, scoping review, evidence synthesis, health outcomes, marginalized populations, public health

INTRODUCTION

There is increasing interest across the health sciences in how the arts contribute to health and wellbeing, as evidenced by initiatives such as the World Health Organization's Global Arts and Health Program and an upsurge in evidence synthesis, including scoping and systematic reviews (Fancourt and Finn, 2019; Golden et al., 2019; World Health Organization [WHO], 2021). This article reports the results of a scoping review on how the arts have been used in the recent past to address wellbeing in communities in the United States.

Wellbeing and the arts are both difficult to define, and neither concept has a single universally accepted definition. This lack of definition results naturally from the breadth and complexity of each domain, yet presents significant challenges to research—both within and at the intersections of the domains.

The challenge of defining wellbeing and identifying its implications for research have been frequently noted and numerous definitions or frames for wellbeing have been offered (Ryff and Keyes, 1995; Carlisle and Hanlon, 2008; Dodge et al., 2012; Naidoo, 2019). Dodge et al. (2012) reviewed attempts to define the concept in scholarly literature and proposed a definition

of wellbeing as "the balance point between an individual's resource pool and the challenges faced" (p. 230). This definition centers on the fluctuating balance of challenges and resources across psychological, physical, and social dimensions. Other definitions focus on how individuals evaluate their own lives (Diener, 2000). For example, the Robert Wood Johnson Foundation (RWJF) describes wellbeing as "the comprehensive view of how individuals and communities experience and evaluate their lives, including their physical and mental health and having the skills and opportunities to construct meaningful futures" (Robert Wood Johnson Foundation [RWJF], 2019). Similarly, relational wellbeing represents an interchange between personal, social, and environmental processes that is socially and culturally created and occurring in a particular time and place (Atkinson, 2013; White, 2015; Tan, 2020). In the recent World Health Organization (WHO) report on the arts, health and wellbeing, the concept is framed subjectively to include "affective wellbeing (positive emotions in our daily lives), evaluative wellbeing (our life satisfaction) and eudemonic wellbeing (our sense of meaning, control, autonomy, and purpose in our lives)" (Fancourt and Finn, 2019, p. 21).

Similarly, and understandably, "the arts" also defy common definition. The arts have many forms and interpretations; and represent experiences that are also subjectively defined. Fancourt and Finn (2019), however, offer several fundamental and cross-cultural characteristics of the arts, including presence of an object or experience that is valued beyond its utility, imaginative experiences, and emotional involvement. Davies et al. (2015) offer a working definition in the form of a classification of art forms specifically for research on the arts in relation to health, including: performing arts; visual arts, design, and craft; community/cultural festivals, fairs and events; literature; and online, digital and electronic arts. These categories were created specifically for studies of arts in health, and those that seek to explore causal pathways that link the arts to health outcomes. This definition recognizes a range of engagement with the arts, from participatory art making to listening, viewing, or watching. Recognizing that passive is a flawed term in this context-as listening and watching are not fully passive, but invite active cognitive, emotional, and other forms of engagement and participation–the terms active participation and receptive participation are used to represent this distinction (Davies et al., 2016; Story et al., 2021).

Interest in the arts as a means for promoting health and enhancing wellbeing has expanded significantly in recent decades. A recent World Health Organization report presented a scoping review of over 3,000 publications that investigate the arts in relation to health and wellbeing (Fancourt and Finn, 2019). In the United Kingdom and several other countries, arts activities are prescribed within national or regional social prescribing, or "arts on prescription," programs (Polley et al., 2017; Chatterjee et al., 2018). Outcomes of these programs include improved wellbeing, physical and mental health, social support, and management of health-related conditions, as well as health care cost reduction and decrease in emergency room use (Chatterjee et al., 2018; Drinkwater et al., 2019; Fancourt and Finn, 2019; Redmond et al., 2019). While several state or regional pilots are currently under way, no national social prescribing structures have been developed in the United States.

There is also a growing body of research exploring how the arts contribute to wellbeing at the community level. Recent studies and reports suggest that arts and cultural practices enhance social cohesion, preserve culturally relevant social capital, and contribute to healthy communities, as well as to individual wellbeing (Landry, 1996; Daykin, 2012; Gillam, 2018; Sonke et al., 2019; Vougioukalou et al., 2019; Engh et al., 2021). The 2017 Survey of Arts Participation in the United States, a nationally representative survey, reported that 54% (n = 133 million) of US adults attend creative, arts or cultural activities, 54% create or perform art, 57% read short stories, novels, poems or plays, and 74% use electronic media to consume artistic content (National Endowment for the Arts [NEA], 2019). Analyses of data from the General Social Survey also confirmed a social gradient in arts participation in the United States, with greater disparity in attendance at arts events than in participation in arts activities (Bone et al., 2021a). In a recent statistical study, Bone et al. (2021b) found positive associations between participation in arts groups and elements of evaluative, experienced, and eudaimonic wellbeing in the United States population.

The field of arts in health in the United States has focused strongly on the use of the arts in clinical settings. Many studies and reviews globally include reports on arts interventions that take place in the clinical setting (e.g., hospitals, clinics, and long-term care) such as Deatrich et al. (2016), Cosio and Lin (2018), Fancourt and Finn (2019), Golden et al. (2019), and Ambler et al. (2020). However, work is also being done throughout the country that engages the arts to address wellbeing outside of clinical settings, at the population and community level. For this reason, this review was designed to include only studies that occurred in the community with a focus on wellbeing and in a public health context. From a public health perspective, wellbeing contributes to disease prevention and health promotion by integrating physical and mental health (Dunn, 1973). Understanding of how wellbeing contributes to disease prevention and health promotion builds upon the World Health Organization's (WHO) definition of health as a "state of complete physical, mental and social wellbeing and not merely the absence of disease and infirmity" (1948, p. 1).

The overall aim of this scoping review was to identify and examine ways in which the arts have been used to address wellbeing in communities in the United States. The objectives were to identify the types of artistic practices, tools used, and interventions being conducted to address wellbeing in communities.

This review describes study populations, research designs, art forms, wellbeing frameworks, interventions, and outcomes. Studies were included that either describe their purpose as addressing wellbeing or were determined by the researchers to address one or more of the key components of wellbeing: psychological, physical, or social. The review also identifies gaps in literature and offers recommendations for future work in the field.

METHODS

The scoping review was guided by the following research question: *how have the arts been used to address wellbeing in communities in the United States*? The review used the Dodge et al. (2012), Fancourt and Finn (2019), and Robert Wood Johnson Foundation [RWJF] (2019) definitions of wellbeing to form a multidimensional, but clear, framing. This framing encompassed wellbeing on the individual level as balancing challenges and opportunities in one's life via psychological, physical, and social components (Dodge et al., 2012), and also encompassed dimensions of subjective wellbeing, affective wellbeing, evaluative wellbeing, and eudemonic wellbeing (Fancourt and Finn, 2019).

The review also engaged a broad and inclusive concept of the arts, drawing on Davies et al.'s (2012) categorizations to include performing arts; visual arts, design, and craft; community/cultural festivals, fairs and events; literature; and online, digital and electronic arts.

Community setting was defined to include settings such as community centers, parks, arts facilities, schools, prisons, etc., and to exclude programs taking place in settings such as hospitals, health centers, and long-term care facilities. For this review, a community was considered as a group inhabiting a common geographic place, having one or more common ties, or sharing a common identity-forming narrative (Hillery, 1982; Lowe, 2021). Within this definition, it is recognized that communities of people share common geographic areas, including those composed of culturally distinct members and culturally heterogeneous groups. Transient communities are also recognized, including temporary, resettled, dispersed, or displaced residents, and including migrant, diasporic, or student communities.

This scoping review examines literature that specifically states a focus on improving or addressing wellbeing through the arts. It focuses on work undertaken in the United States, excluding the territories and protectorates, with the purpose of capturing evidence from programs that are being conducted under similar social and policy contexts. The search was restricted to publications in the past 7 years to capture the most recent work, and to focus on identification of current challenges, opportunities, and considerations relevant to future work in this area.

Study Eligibility

The review was guided by The Joanna Briggs Institute's (JBI) Methodology for JBI Scoping Reviews (Peters et al., 2017). This methodology provides an overview of evidence in a research area, with a systematic process for literature searching, screening, and analysis. It was conducted as one of two scoping reviews that were part of a larger project focusing on the use of the arts in community health settings in the United States. The first scoping review examined arts-based programs in health communication (Sonke et al., 2021b). A protocol for the entire project, inclusive of both reviews, was registered with the JBI in January 2019, under the preliminary title "Engaging the Arts in Health Communication and Wellbeing: A Scoping Review."

Study Inclusion and Exclusion Criteria

The PICOS framework was used to identify inclusion criteria:

Population (P): People of all ages participating in a community setting in the United States. The community setting was defined as outside of a health facility, but it could take place in a senior living community, prison, school, etc.; it could be conducted by a hospital, but in a community setting.

Intervention (I): The intervention was an arts-based intervention, program, or practice intended to address wellbeing.

Comparator (C): Studies comparing arts interventions to other interventions, and studies with no comparator were included.

Outcomes (O): All wellbeing outcomes were included. Those outcomes that assess affective wellbeing, evaluative wellbeing, and eudemonic wellbeing in the individual and community were eligible for inclusion.

Study Design (S): All research designs were included. Reports evaluating programs were included. Systematic and scoping reviews were excluded.

This review focused on work done in the recent past and was limited to studies published on or after 1 January 2013, with interventions concluding after January 2008. Only papers determined by the research team to be from credible sources were considered. These included articles from scientific journals, as well as reports from professional organizations, governmental, and non-governmental organizations, or agencies (i.e., the World Health Organization). Doctoral dissertations and master's theses were also evaluated against inclusion/exclusion criteria, and only English language full text publications were included.

Data Sources

Two health sciences librarians developed and conducted the literature search (JMD and NS). An initial search for existing related systematic and scoping reviews or protocols was carried out on 24 August 2020. The keyword search strategy (art OR arts OR artistic OR artist OR artists) AND (wellbeing OR "wellbeing" OR "wellbeing") was used in BioMed Central Systematic Reviews, Campbell Collaboration Education Group, Cochrane Database of Systematic Reviews, Cochrane Public Health Review Group, JBI Systematic Review Register, JBI Evidence Synthesis, and PROSPERO: International Prospective Register of Systematic Reviews. Most of the four related registrations from the previous 7 years focused on Australia or the United Kingdom; none focused solely on the United States. In addition, none of the reviews or protocols examined how the arts were being used to address wellbeing at a broad community-level.

Search Strategy

The base search strategy for the full literature review was developed iteratively. This search was conducted in seven databases that focused either on the arts or health: PubMed; Web of Science; ProQuest's Applied Social Sciences Index and Abstracts; and EBSCOHost's Alt HealthWatch, Art and Architecture Source, CINAHL, and APAPsycINFO. On 31 August 2020, the final literature search exploited subject headings (when such headings were offered in a database) and keywords for each concept mentioned above in the

Data Sources section, as well as terms for community (non-healthcare facility) settings and geographic locations within the United States (though not specifically its territories and protectorates.) When a database contained no relevant subject heading for a concept, the search consisted only of keywords for that concept. All keyword searching for a concept involved truncated and phrase-searched terms in title and abstract fields. Where possible, results were limited to the United States (including specific states and some specific cities), publication dates 1 August 2013, onward, and English language full text (PubMed Search Terms, **Supplementary Table 5**).

The 1,729 results were exported from the databases into EndNote and de-duplicated. In preparation for screening, the remaining 1,278 unique references were exported into Covidence. Subsequently, the project team hand-searched the following web archives and databases: National Organization for Arts in Health (NOAH), Alliance for the Arts in Research Universities (a2ru), American Art Therapy Association, American Music Therapy Association, the University of Florida Center for Arts in Medicine Research Database, and the National Endowment for the Arts. Three hundred and eighty additional references were added to Covidence from the hand-search. After automated de-duplication from within Covidence, the final total number of references for title/abstract screening was 1386.

Study Selection

Title and abstract and full text screening were completed by the research team members in independent blinded pairs using Covidence. Agreement between two reviewers was required with a third reviewer resolving discrepancies, as needed.

Data Extraction

The authors developed a screening form in Covidence's data extraction tool. The research team extracted the data (A.C., M.C., and S.H.), and it was checked for accuracy and completeness by a separate author (V.P.).

RESULTS

Numerical Summary

After title and abstract and full text screening by AC, JS, VP, MC, and SH, 44 studies were included in the final review. Of these, there were 11 doctoral dissertations, 1 master's thesis, and 5 reports. The remaining 27 records were original research articles (PRISMA Diagram, **Supplementary Figure 1**).

Sample Size and Populations

The combined study populations of the included results represented a total of 5,080 research participants. The sample size ranged from 8 to 1,198 with a mean of 134 and a median of 21. Additionally, 178,000 participants were included in an evaluation report (Pourat et al., 2018). The various target populations were described by race/ethnicity (e.g., Indigenous, Black, African American, Latinx, Chinese, Filipino, and Burmese), age (e.g., older adults, adolescents, youths, students, and adults), profession or activity (e.g., laborers, farmers, musicians, and dancers).

Most articles (n = 34) focused on how arts interventions were used to improve wellbeing in marginalized populations. The study used two complementary concepts to form its definition for marginalized populations. The first oriented toward power imbalance, "marginalization as a multidimensional, dynamic, context-dependent, and diverse web of processes, rooted in power imbalance and systematically directed toward specific groups and individuals, with probabilistic implications for development" was used for the analysis (Causadias and Umaña-Taylor, 2018). And the second oriented toward identities, recognizing exclusion due to gender identity, race, age, sexual orientation, physical ability and/or immigration status (Baah et al., 2019). For the analysis, the definitions given by the study authors were used. Older adults were considered those 55–64 years old, and elderly were considered those 65 or older.

Populations identified in the studies included indigenous (n = 5), African American/Black (n = 7), immigrant (n = 5), elderly or older adult (n = 7), young adult (n = 2), youth and children (n = 2) and women and girls (n = 7). For example, Ka'Opua et al. (2016) addressed intergenerational connection and cultural resilience between native Hawaiian young adults and elders through an active-participatory storytelling curriculum. Kitwana (2014) used ethnographic methods and active-participatory dance to explore holistic wellbeing (psychological, physical, and social) needs in African American/Black adults (n = 7). Mares et al. (2020) addressed self and collective perceptions of felt and real structural forms of violence and vulnerability in Latinx day-farmworkers in Vermont through a combined comic-book and gardening intervention. Harrison et al. (2020) addressed perceptions, beliefs, opinions, and attitudes about physical activity and exercise in 58 urban-residing elderly minority individuals. Brown (2017) used the Social Justice Youth Development framework to address trauma, racialized gender oppression, and healthy development in African American/Black youth through an artistic expression program designed to facilitate healing. Deng (2017) investigated the effects of museum-based experiences on learning and behavioral outcomes in children with autism. Finally, McConnell et al. (2016) addressed gendered oppression through semi-structured interviews with participants of the Michigan Womyn's Music Festival (**Table 1**).

Study Designs

Study designs were identified by the researchers and coded by VP and AC. Two broad categories emerged: outcomes research studies and descriptive studies.

Outcomes Research

The first study design category, outcomes research, included studies that measured results of an arts intervention or reported results of being engaged in the arts on wellbeing. This category included the subcategories of evaluation, community-based participatory research (CBPR), experimental, correlational, and model testing.

TABLE 1 | Marginalized populations.

Populations	Number	References
Indigenous	5	Anguluan-Coger, 2013; Ka'Opua et al., 2016; Mitchell, 2016; Lamar, 2019; Doğan and Timothy, 2020
Elderly/Older adult	7	Gooding et al., 2014; Moore et al., 2017; Cantu and Fleuriet, 2018; Fleuriet and Chauvin, 2018; Harrison et al., 2020; Johnson et al., 2020; Strong and Midden, 2020
Immigrant	5	Stephenson et al., 2013; Novak, 2016; Fleming et al., 2017; Yam, 2017; Mares et al., 2020
Women and girls	6	Moe, 2014; O'Brien, 2015, 2016; McConnell et al., 2016; Travis et al., 2016; Teti et al., 2017
Young adult	2	Travis and Bowman, 2015; Porias, 2020
African American/Black	7	Kitwana, 2014; Brown, 2017; Camp, 2017; Schroeder et al., 2017; Atkins et al., 2018; Campbell, 2019; Addie et al., 2020
Children/Youth	2	Ja, 2014; Deng, 2017
Total	34	

Evaluation Studies

The seven evaluation studies appraised programs or curricula. Outcome evaluation studies are designed to measure the program goal. These designs can involve both quantitative and qualitative methods. All these studies reported psychosocial and cohesion outcomes. For example, Brown (2017) evaluated a "Healing Space of Refuge" youth development program for Black youth and found that the program contributed to cultural cohesion and improved family relationships. Ka'Opua et al. (2016) evaluated an oral history curriculum for school-aged children utilizing native Hawaiian elders' stories, finding increased knowledge of social responsibility and intergenerational connection.

Community-Based Participatory Research

Nine studies used community-based participatory research methods as identified by the studies' authors. This research approach is often used by public health organizations with populations that experience marginalization. The community-based participatory research (CBPR) approach involves a process wherein researchers and community stakeholders act as equal partners in the research process. The goals generally are educating the community, improving practice, or social change (Tremblay et al., 2018). Of these methods, participatory action research, community-based participatory research, or Photovoice were identified by the study authors. The CBPR articles concentrated on community involvement and assessment for the development of programs (n = 2), evaluation of art-based programs (n = 3), and to understand the health and wellbeing of a population (n = 4). Of note, MacAulay et al. (2019) utilized CBPR to develop and evaluate a music training program for older adults, finding statistically significant ($p < 0.05$) improvement in executive function, global cognition, verbal fluency, visual memory performance, self-efficacy, and emotional wellbeing.

There were four studies that used Photovoice methodology. Photovoice is "a public health strategy in which underserved individuals use photography and narratives to identify, record, and share their personal and community health experiences" (Catalani and Minkler, 2010). Teti et al. (2017) used Photovoice to provide mental health support for women living with HIV. This was found to facilitate expressing emotions, address distress and process trauma, which led to empowerment.

Experimental Studies

Experimental studies are used to establish evidence of causation. Essential elements include manipulation of the independent variable, a control group, and random assignment of subjects to a study group (Gray and Grove, 2021). The three randomized control trials included two studies of older adults using, drama, and choir interventions (Moore et al., 2017; Johnson et al., 2020). These interventions produced findings of increased self-esteem, confidence, happiness and interest in life, and decreased loneliness. A study of a 4-week journaling intervention of parents found a decrease in negative affect (Ahmed, 2017).

Correlational and Model Testing Studies

Correlational studies establish the strength and direction of relationships between variables (Gray and Grove, 2021). There were four correlational studies. A longitudinal correlational study on musical training on cognition in older adults was conducted by Gooding et al. (2014). A correlation was found between the ability to read music and increased performance on the Animal Naming Test (ANT; semantic verbal fluency) and Logical Memory Story A Immediate Recall (LMI; episodic memory) measures. An association was found between cognitive reserve and improved late-life episodic and semantic memory.

Additionally, Strong and Midden (2020) compared cognition of adult instrumental musicians (active vs. former) and non-musicians. A standardized neuropsychological battery and self-reported measures of levels of physical activity, social activity, and overall health were used. All musicians (active and former) had higher scores on the Boston Naming Test and Controlled Oral Word Association compared to non-musicians. Active musicians scored highest on the Stroop task (Delis-Kaplan Executive Function System: Color Word Interference), indicating that cognitive benefits (in the domain of language) of early life music lessons continue into late life.

Model testing is correlational research methods that measures proposed relationships in a theoretical model (Gray and Grove, 2021). A study by Meeks et al. (2018) tested flow state as a model of psychological benefit from theater, finding that theater

had an indirect effect on individual and community wellbeing across all ages. Travis and Bowman (2015) used a comparative correlational design to test a measure of empowerment and risk in association with music engagement and its application to the individual and community.

Descriptive Studies

Descriptive studies describe the characteristics of an individual, situation, group, or population (Gray and Grove, 2021). A total of 17 descriptive studies focused on describing program participants' perceptions, motivations, meaning, and attitudes in relation to arts interventions. These studies had quantitative (n = 3), qualitative (n = 5), and mixed methods (n = 6) designs and included ethnographies (n = 3) and reports (n = 5, the reports are not counted as studies). For example, Ja's (2014) study of high school students found that students participating in performing and fine arts programs reported higher autonomous motivation than students in academic clubs. Doğan and Timothy (2020) evaluated the effect of ecomuseums on the Ak-Chin tribal community, finding positive social and cultural benefits for the entire community.

Ethnographies (n = 3) included a study of West African dance on mental health that found improvements in emotional regulation, maintaining presence, and addressing diasporic stressors (Kitwana, 2014). McConnell et al. (2016) explored the Michigan Womyn's Music Festival and found it promoted adaptive responding, including safety, empowerment, self-expression, and sense of community with other women.

Reports

The reports in this review identified projects and studies which met the protocol criteria. Five reports were not research studies but did evaluate programs (O'Brien, 2016; Pourat et al., 2018; Campbell, 2019; Lamar, 2019; Sonke et al., 2019). Programs included Healing in Motion which used Dance Movement Therapy to help heal Post Traumatic Slave Syndrome (Campbell, 2019). Similarly, the Move 2 Love dance program was developed to support physical and social wellbeing in older women and has operated for over 23 years. The evaluation reported addiction avoidance, increased physical activity, and increased social and psychological wellbeing (O'Brien, 2016).

Lamar (2019) found that a program to connect museum art collections to the native peoples whose culture the art collection represented increased community wellbeing. Pourat et al. (2018) evaluated Parks After Dark, a program designed to increase access to high quality recreational activities in poorer neighborhoods of Los Angeles County. The authors reported positive changes in all six of their goals, including lowered rates of violence and greater perceptions of safety among participants, as well as increased physical activity, social cohesion, and perceptions of community wellbeing.

A report by Sonke et al. (2019) presented art programs in the United States that addressed collective trauma, racism, mental health, chronic disease, social exclusion, and social isolation. The programs described cross sector collaboration between community development, public health, and arts and culture (**Table 2**).

TABLE 2 | Study designs.

Study design	N	Levels of evidence (JBI)
Outcomes research		
Evaluation	7	Level 3.e
Community-based Participatory research (CBPR) evaluative	3	Level 3.e
RCT	3	Level 1.c
Correlational	4	Level 3.e
Descriptive studies		
Qualitative, quantitative, and mixed methods	14	Level 4.c, 4.d
CBPR-photovoice-descriptive	3	Level 4
CBPR-descriptive-other methods	2	Level 4
Ethnographies	3	Level 4
Reports	5	Level 5
Total	44	

Art Forms and Types of Participation

The arts forms used in the interventions were grouped either by a specific type of art form (e.g., music, dance, theater, and literary) or mixed art forms (i.e., two or more art forms). Additionally, they were grouped by type of involvement, either active participation or receptive participation (Turino, 2008; Story et al., 2021).

Active Participation

Active participation was the most prevalent mode of arts involvement in the reviewed studies (n = 38). Active participation by dancing, playing an instrument, singing (music), acting in a theater production, or journaling (literary art) are examples. Art forms included mixed arts (n = 14), dance (n = 9), music (n = 8), theater (n = 3), literary arts (n = 2), and storytelling (n = 2). Participation in dance programs (n = 9) were found to be a low cost, enjoyable and culturally appropriate means to accessible physical activity for children and adults with positive benefits to physical, social, and psychological wellbeing (Kitwana, 2014; Moe, 2014; Feinberg et al., 2016; O'Brien, 2016; Schroeder et al., 2017; Atkins et al., 2018; Campbell, 2019).

Literary arts interventions included journaling for parents and creative writing for a junior college geology course (Ahmed, 2017; Porias, 2020). Storytelling included oral histories with indigenous elders (Ka'Opua et al., 2016). The mixed active participation art forms included photography/visual arts and storytelling (n = 4), weaving and storytelling (n = 1), architecture, design, and planning (n = 1), multiple arts and cultural activities n = 1), music and storytelling (n = 1), music and architecture (n = 1), music concerts and musicals (n = 1), and visual and literary (n = 1).

Receptive Participation

Receptive participation includes watching a performance or engaging in cultural activities (n = 6) (Small, 1998; Turino, 2008). Of the art forms with receptive participation, cultural activities i.e., museum visitation (n = 3), theater (n = 2), and music concerts (1) were included. Overall, participation in these art

TABLE 3 | Arts forms and participation types.

	N
Arts forms	
Mixed	13
Dance	9
Music	8
Theater	5
Storytelling	4
Participation in museums	3
Literary	2
Total	44
Participation type	
Active	34
Receptive	6
Both	4
Total	44

forms indirectly related to satisfaction and enjoyment of theater events, hedonic wellbeing, social functioning via flow states, sense of belonging, and social engagement. The mixed receptive participation art forms included musical theater and concerts ($n = 1$).

Both Active and Receptive Participation

This category included studies of activities that engaged people in both active art-making and observation of arts programming. Four studies containing both active and receptive mixed arts participation (e.g., physically dancing and watching a dance performance) were included. Zitcer et al. (2016) gathered qualitative and quantitative data in three adjacent West Philadelphia neighborhoods to determine the strategic value of arts/culture engagement upon community empowerment. In interviews study participants stated the importance of the arts, its value, and the contribution to improve their overall quality of life. Specifically, participants discussed how the arts improve the lives of children. They found that the arts engage children and provide outlets for youth and perceive that this improves the safety of their neighborhoods (**Table 3**).

Units of Analysis

This review considered wellbeing as reported in the included studies at the individual and community levels. In keeping with Dodge et al. (2012), individual wellbeing was framed around three components—psychological, social, and physical. Individual wellbeing that included all three characteristics was considered "holistic wellbeing." In keeping with Robert Wood Johnson Foundation [RWJF] (2019), community wellbeing was defined as how "communities experience and evaluate their lives." Each article was coded and categorized as individual or community. Further, the studies were coded as psychological, social, physical, and holistic.

For example, the research presented by Strong and Midden (2020) assessed individual differences between older adult musicians and non-musicians that continue or discontinue playing into late life. The study by Evans and Liu (2019) addressed individual and psychological wellbeing. Their quantitative research investigated the effects of participation in a high school orchestra on members' self-esteem. In contrast, at the community level, the study by Mares et al. (2020) assessed several arts interventions designed to address structural violence and structural vulnerability that effect the wellbeing of farmworker communities. Of note, participatory dance programs were found to benefit participants on a holistic level. Findings show positive results on physical, social, and psychological wellbeing (Kitwana, 2014; Moe, 2014; Feinberg et al., 2016; O'Brien, 2016; Schroeder et al., 2017; Atkins et al., 2018; Campbell, 2019).

Outcomes Measured

The included articles reported several types of research outcomes. These outcomes were coded utilizing the taxonomy by Dodd et al. (2018). This taxonomy was used in a recent scoping review (Golden et al., 2019). In this taxonomy the outcomes are divided into a core area and a subdomain. wellbeing outcomes were found in two core areas: Life Impact and Resource Use. Most studies reported outcomes in the Life Impact domain with Emotional Functioning/Wellbeing ($n = 21$) and Social Functioning ($n = 19$) as the most common areas of focus. In the subsequent paragraphs, Life Impact including social, emotional, and physical functioning, global quality of life, and cognitive functioning is followed by Resource Use including economic and hospital/healthcare.

Life Impact-Emotional Functioning

Emotional functioning is defined as the "impact of disease /condition on emotions or overall wellbeing (e.g., ability to cope, worry, frustration, confidence, perceptions regarding body image and appearance, psychological status, stigma, life satisfaction, meaning and purpose, positive affect, self-esteem, self-perception, and self-efficacy)" (Dodd et al., 2018). Reported outcomes in this area included increases in self-awareness, self-esteem, happiness, confidence, self-efficacy, grit, vitality, sense of self-achievement, experience of flow, positive attitude toward aging, autonomy, competence, motivation, empowerment, psychological safety, and feeling valued, as well as reductions in negative affect and mental health distress (n-21). For example, in a study of the effects of a 6-week Drama Workshop program, Moore et al. (2017) found that participants reported positive changes in happiness, confidence, and self-esteem post-treatment.

Life Impact-Social Functioning

Social functioning refers to "the impact of disease/condition on social functions (e.g., ability to socialize, behavior in society, communication, companionship, psychosocial development, aggression, recidivism, participation)" (Dodd et al., 2018). The findings in these studies included increased social cohesion, social activity, social connectedness or a decrease in social isolation/loneliness, or social exclusion after attendance in a class or arts intervention ($n = 19$). For example, social interaction skills in children with autism were found to improve after several visits to an art museum (Deng, 2017).

TABLE 4 | Outcomes measured using taxonomy by Dodd et al. (2018).

Domain	Definition	Number
Life impact		
Emotional functioning	"The impact of disease condition on emotions or overall wellbeing (e.g., ability to cope, worry, frustration, confidence, perceptions regarding body image and appearance, psychological status, stigma, life satisfaction, meaning and purpose, positive affect, self-esteem, self-perception, and self-efficacy)"	21
Social functioning	"The impact of disease/condition on social functions (e.g., ability to socialize, behavior in society, communication, companionship, psychosocial development, aggression, recidivism, participation)"	19
Physical functioning	"Physical activities of daily living (for example, ability to walk, independence, self-care, performance status, disability index, motor skills, sexual dysfunction, health behavior and management)"	7
Global quality of life	"Includes only implicit composite outcomes measuring global quality of life"	6
Cognitive functioning	"The impact of disease/condition on cognitive function (e.g., memory lapse, lack of concentration, attention), outcomes relating to knowledge, attitudes and beliefs (e.g., learning and applying knowledge, spiritual beliefs, health beliefs/knowledge)"	5
Resource use		
Economic	"General outcomes (e.g., cost, resource use)"	2
Hospital/Healthcare	"Hospital: outcomes relating to hospital care"	1

Life Impact-Physical Functioning

Seven publications reported that arts interventions impacted physical functioning, defined as "physical activities of daily living (for example, ability to walk, independence, self-care, performance status, disability index, motor skills, sexual dysfunction, health behavior, and management)" (Dodd et al., 2018). Participatory dance affected physical functioning in all studies. Outcomes reported included improved physiologic wellbeing, lowered disease burden, prolonged life, more energy, a stronger body, and increasing physical, social, and psychological fitness (Kitwana, 2014; Moe, 2014; Feinberg et al., 2016; O'Brien, 2016; Schroeder et al., 2017; Atkins et al., 2018; Campbell, 2019). For example, Schroeder et al. (2017) studied an intergenerational program for children and adults in an urban community (n = 521), finding positive physical benefits as well as increased community engagement and enjoyment.

Life Impact-Global Quality of Life

Five studies measured global quality of life. In these studies, the measurement was accomplished by using several quality of life and wellbeing measures, such as the Quality of Life AD (Kahle-Wrobleski et al., 2016), Satisfaction with Life Scale (SWLS) (Diener et al., 1985), and the Psychological Wellbeing Scale (PWB) (Diener and Biswas-Diener, 2009). Three of these studies did not find a statistically significant change in global quality of life after the arts intervention. Two studies, Ja (2014) and Meeks et al. (2018), reported a positive increase in global quality of life measures. In a study of theater involvement in Vandenbroucke and Meeks (2018) found a significant difference in global quality of life related to theater involvement (philanthropy and volunteers) and attendance (subscribers and attendances) (All measurement instruments used in studies in this review can be found in **Supplementary Table 6**).

Life Impact-Cognitive Functioning

Five studies addressed cognitive functioning, defined as the "impact of disease/condition on cognitive function (e.g., memory lapse, lack of concentration, and attention), outcomes relating to knowledge, attitudes and beliefs (e.g., learning and applying knowledge, spiritual beliefs, and health beliefs/knowledge)" (Dodd et al., 2018). Results reported by Gooding et al. (2014); MacAulay et al. (2019), and Strong and Midden (2020) demonstrated cognitive benefits of music. Cantu and Fleuriet (2018) found that painting, drawing, mixed media, and creative writing enhanced the ability to focus among older adults.

Resource Use-Economic

This category included articles that assessed utilization of economic resources and hospital use. Two studies assessed resource use relating to food and water. Mares et al. (2020) used storytelling along with community gardening, and a participatory comics and storytelling intervention to address issues of food insecurity and barriers in access to fresh and culturally familiar produce with goals of fostering mental health, participation in a free clinic, and education of the public about farmworkers vulnerability. Mitchell (2016) utilized Photovoice (visual arts and storytelling) to engage members of the Kickapoo Tribe in identifying the effects of water insecurity in their community.

Resource Use-Hospital/Healthcare

Johnson et al. (2020) measured hospital resource use and other healthcare costs, including hospital use, in their study of a community choir for older adults. They reported a near tripling of health care costs for the control group and a doubling of costs for the intervention group over a 6-month period (**Table 4**).

Negative Outcomes

This review found evidence that arts interventions can have negative outcomes. Moore et al. (2017) found lower anxiety in a control group than those in a drama workshop intervention group. In a study of the effect of listening to rap music on college students, among other findings, Travis and Bowman (2015) reported a higher likelihood of thinking about engaging in sexual activity, drinking alcohol, and marijuana use when listening to rap music than when listening to most other types of music. Surprisingly, there were no completely null findings in any of the publications included in this review (see Extracted Data for All Publications, **Supplementary Table 7**).

DISCUSSION

This scoping review was designed using JBI Methodology for Scoping Reviews (Peters et al., 2020). This review type was chosen for the purpose of mapping the key concepts and to "clarify working definitions and/or conceptual boundaries of a topic" (The Joanna Briggs Institute [JBI], 2015). The complexity of the working definitions of both wellbeing and the arts made this task difficult. While there is great interest at present in wellbeing at both the individual and community levels, the lack of universal definitions for the concepts of both wellbeing and the arts poses a significant challenge to evidence synthesis. Given that neither of these concepts is likely to be more clearly defined, the development of Core Outcomes Sets (COS), reporting guidelines, as well as common taxonomies and search strategies for arts in wellbeing research are necessary to increase the possibility for systematic reviews and meta-analyses that can synthesize the increasingly ample evidence and offer insights that can guide investments in the arts for promoting health and wellbeing in communities. These needs have also been noted by other authors (White, 2006; Fancourt and Finn, 2019; Golden et al., 2019; Sonke et al., 2021a). Core outcomes should include healthcare utilization and access, as well as community and individual outcomes.

Outcome measures and subsequent core outcome sets, "aim to improve the consistency and quality of research by providing agreed-upon recommendations regarding what outcomes should be measured as a minimum for a population and setting" (Ramsey et al., 2021). These COS are developed by consensus methods of key stakeholders (Williamson et al., 2012). While COS have been used for many years to guide research and clinical practice and in other disciplines, such and medicine and public health. The use of core outcomes for arts interventions have only recently been considered in relation to public health, and work on core outcomes for arts interventions is currently in the early stages (Smith et al., 2021). The outcomes domains highlighted in this study suggest that arts interventions could be classified in alignment with current outcomes identified in medical taxonomy (Dodd et al., 2018).

As this review suggests, active participation in the arts, particularly in dance and music, has the potential to affect outcomes related to the Dodd et al. (2018) domains of life impact, including social, emotional, and physical functioning, and cognitive functioning. Arts interventions that occur in a group setting may impact social functioning, social isolation, and social cohesion. Impacts of the arts on resource use and hospitalization/healthcare utilization could be further explored.

In keeping with the JBI Methodology, the JBI Levels of Evidence (2014) (The Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party, 2014) were used in this study. Reasonably, recent publications question the use of levels of evidence in relation to arts interventions, due to reliance on quantitative methods (Clift et al., 2021). Use of these levels in this study was not intended to attribute hierarchical value to the studies, their methods, or their findings, but rather to provide an overview of the types of studies being conducted. This study recognizes that qualitative methods are critical to understanding the impact of arts practices and interventions. The JBI Levels of Evidence acknowledges this importance and has implemented the Levels of Evidence for Meaningfulness which includes qualitative and mixed methods designs.

The levels of evidence were also used to assess the overall state of the literature. Because research often advances from descriptive to experimental, the levels of evidence can be used to assess overall research progress in a review (Gray et al., 2017). The majority of the studies in this review were descriptive studies (level 4), but there is an indication of progress toward increasing strength with three studies at level 1 (RCT). This indicates that research on the arts and wellbeing is weak but may be advancing in the United States. However, while the levels of evidence are widely utilized in clinical practice, they may have limited use in other fields. For example, there is no level for public health research such as comparative effectiveness research and studies with designs using large population-based data. Also, there are no clinical indicators for wellbeing in the community setting, which further limits the usefulness of levels of evidence.

This review reports mostly positive associations between engagement in the arts and wellbeing at both the individual and community levels in the United States. The reviewed studies collectively suggest positive associations at the individual level across a broad spectrum of psychological, physical, and social outcomes, with multiple studies highlighting associations between engagement in the arts and improvements in self-esteem and identity formation, cognition, physical balance, and physical conditioning. These effects on wellbeing were more evident with active participation than with receptive participation. Notably, there were more studies involving music and dance than other art forms. These interventions often include group interactions, effecting social wellbeing. This finding is consistent with other reviews (Fancourt and Finn, 2019; Dingle et al., 2021).

There are few other reviews focusing on the arts at the community level. Findings of original research at the community level include improved connection between individuals, often highlighting the significance of intergenerationally and socio-culturally relevant traditions to facilitate these connections. The benefits and value of access to the arts demonstrated in these studies support the need to advance inclusion of arts and cultural activities in education and community development, particularly to improve quality of life and overall wellbeing.

Negative outcomes from arts interventions were found in two studies included in this review. More negative outcomes may occur but may not be found in the literature due to publication bias toward positive outcomes. Gray literature was used in this search in an attempt to balance this bias, but this area requires more consideration in future research.

Social capital and cohesion are increasingly being explored as significant determinants of wellbeing for communities and for individuals within communities, and the arts have been investigated as a means for enhancing social cohesion (Matarasso, 1997; Macnaughton et al., 2005; Ehsan et al., 2019; Sonke et al., 2019; Engh et al., 2021). The findings of this review support the idea that both the availability of arts and cultural resources in

communities and targeted arts interventions may be important for promoting individual and collective wellbeing. These results also support the movement toward social prescribing, wherein arts, cultural and social activities can be prescribed by care providers (and sometimes paid for by health systems). Social prescribing programs have been associated with positive health and wellbeing outcomes, and with reducing the burdens on primary and secondary health care systems (Polley and Pilkington, 2017; Drinkwater et al., 2019). Given the different social, economic, political, and healthcare contexts in the nations where social prescribing has been implemented (e.g., the United Kingdom), further research is needed regarding applicability in the United States.

Many of the publications included in this review focus on minority and marginalized populations. While social gradients in arts participation in the United States have been established (Fancourt et al., 2021), indicators of wellbeing among minority and marginalized groups have not been well understood. Previous studies by Ryff (1989, 2017) and Ryff et al. (2003) suggest that minority status may be a positive predictor of eudemonic wellbeing (i.e., purpose in life, personal growth, autonomy, environmental mastery, self-acceptance, and positive relations with others), and that minority-status may uniquely focus and utilize adversities as means to growth-minded behaviors such as finding purpose in life. Ryff (2017) references Keyes (2009), for example, associating higher levels of "flourishing" (low levels of mental distress) among middle-aged Black Americans in contrast to White Americans.

Moreover, collective trauma and racism have been identified as key issues in public health that may well be addressed through arts and culture (Sonke et al., 2019). However, more consideration of minority and marginalized experiences should be brought to studies of the relationships between arts participation and wellbeing, as collective trauma and racism persist in the United States.

This review recognizes several gaps in the literature. Notably, no studies in the review addressed online, digital, or electronic arts. Additionally, the studies included in this review do not represent the entire United States. Two states, California and Pennsylvania were each represented in six studies, and many states were not represented. Reports were included to present arts interventions from more regions.

A lack of standard measures and outcomes was also noted. This may be due to a lack of standardized scales for wellbeing, in general, and certainly points to the lack of core outcomes for arts in public health. Lastly, consistency in reporting is also a challenge to evidence synthesis in this area of focus. Many of the publications did not have significant detail about the art interventions which limits replication of studies and evidence synthesis.

Limitations

Scoping reviews have limitations. Notably, they do not provide a critical appraisal of publications, which limits generalizability of findings. The aim of a scoping review is to overview the evidence related to a particular question (Munn et al., 2018). While systematic reviews are used in evidence-based healthcare to guide clinical decision making and practice, a scoping review is used primarily to identify types of evidence and examine how research is conducted (Munn et al., 2018). Since there were no other reviews that addressed the use of the arts in wellbeing in the United States specifically, a scoping review of the evidence was deemed an appropriate approach. However, the limits of this approach are recognized in regard to the usefulness of findings.

The review included articles published over a 7-year period and interventions completed within the past 12 years, which limited the volume of findings. As noted, the varied and broad definitions, interpretations and concepts of the arts and wellbeing, posed challenges to the development of search terms and inclusion/exclusion criteria as well as analysis of the evidence. The lack of consistent outcomes measures and variation in research designs was evident. While there are benefits to these varied approaches, they pose challenges to presenting an overview of the evidence. This scoping review was conducted at the beginning of the COVID-19 pandemic, too early to capture work specifically being done around the arts and wellbeing in the pandemic context. There is a growing field of literature on this topic which should be investigated as the pandemic continues to unfold.

CONCLUSION

This review suggests that the arts, across a spectrum of forms (e.g., music, dance, and theater) and participatory modalities (e.g., active, receptive, and both), can contribute positively to individual and community wellbeing in the United States. However, heterogeneity in study design limits generalizability between populations, as associations between types of arts participation and wellbeing outcomes differed significantly. Future work including systematic reviews and randomized controlled trials are suggested to narrow gaps in variability between studies and to focus research questions. The study highlights the need for core outcomes sets, and reporting guidelines, and more refined search strategies for advancing evidence synthesis in this area.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

FUNDING

Funding for this study was provided by ArtPlace America. This funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

ACKNOWLEDGMENTS

We extend our gratitude to all who helped make this review possible, Stacey Springs, Max Helgemo, Dionne Blake, the

Creating Healthy Communities: Art + Public Health in America initiative's Research Advisory Team, the University of Florida Center for Arts in Medicine Interdisciplinary Research Lab, and University of Florida Clinical and Translational Science Institute for use of Covidence software.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.791773/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

REVIEW
published: 10 February 2022
doi: 10.3389/fpsyg.2022.821093

The Need for Robust Critique of Arts and Health Research: Young People, Art Therapy and Mental Health

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OPEN ACCESS

Edited by:
Changiz Mohiyeddini, Oakland University William Beaumont School of Medicine, United States

Reviewed by:
Zoe Moula, University College London, United Kingdom
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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *23 November 2021*
Accepted: *10 January 2022*
Published: *10 February 2022*

Citation:
Grebosz-Haring K, Thun-Hohenstein L, Schuchter-Wiegand AK, Irons Y, Bathke A, Phillips K and Clift S (2022) The Need for Robust Critique of Arts and Health Research: Young People, Art Therapy and Mental Health. Front. Psychol. 13:821093. doi: 10.3389/fpsyg.2022.821093

We describe work in progress to conduct a systematic review of research on effects of arts-based programs for mental health in young people. We are at the stage of searching for relevant studies through major databases and screening extant systematic reviews for additional research which meet our inclusion criteria. At this stage, however, concerns have arisen regarding both the quality of existing primary studies and of recently published systematic reviews in this area of arts and health. As a case in point, in this paper we focus on one research report on art therapy with adolescent girls and its inclusion in three systematic reviews. We demonstrate that the reviews fail to undertake a robust critique of the Bazargan and Pakdaman paper and that the paper and reviews are flawed. Drawing on recent criticisms of systematic reviewing, we consider the value of proceeding with our systematic review as initially planned.

Keywords: music, arts, youth, psychiatric disorders, health, review

INTRODUCTION

Clift et al. (2021) have argued the need for robust critique of research on the social and health impacts of the arts. They consider two recent, scoping reviews of the arts and health literature (Fancourt and Finn, 2019; Fancourt et al., 2020) and document problems associated with a lack of critical perspective on the research included. The positive recommendations drawn in these reviews are called into question, and Clift et al. conclude: 'it is premature to suggest, as the WHO and DCMS reports do, that the evidence on arts and health provides a secure foundation on which to develop social and health policy. In moving research and practice forward in future, the field must rely on rigorous systematic reviews involving careful quality assessment of both quantitative and qualitative studies' (p. 13).

Informed by this view, we are currently engaged in conducting a systematic review of controlled studies of creative arts activities/arts therapy for children and young people experiencing challenges to their mental health. A protocol for the proposed review was developed with reference to the latest PRISMA guidelines (Møller and Myles, 2016; Page et al., 2021) and published through PROSPERO.[1]

So far, we have searched major electronic databases and supplemented this approach by cross-checking reference lists in relevant recent reviews. A further tactic has been to use Google Scholar to identify citations of potentially relevant papers in subsequent publications. Our preparatory work, however, has revealed some concerns. Firstly, regarding the questionable quality of published research on the effect of arts-based or creative programmes and therapy for young people with mental health challenges, and secondly, a lack of criticality in recent reviews of this literature.

The aim of this paper is to reflect on what we have found so far, before considering whether to proceed with the planned systematic review. At the time of writing this paper, seven databases have been systematically searched, and two members of the team (KG-H and SC) have independently screened abstracts for relevance. Full text papers have been obtained and organised alphabetically by AKS-W and the first author. The first full text paper to be scrutinised, at the top of the list, is a study of arts therapy for adolescent girls (Bazargan and Pakdaman, 2016). This paper is also included in three recent systematic reviews (Ponomarenko et al., 2017; Cohen-Yatziv and Regev, 2019; Bosgraf et al., 2020). Although Clift et al. (2021) appealed for carefully conducted systematic reviews as the appropriate guide for further developments in research, practice and policy development in arts and health, we will show below these three reviews are far from satisfactory in their treatment of the Bazargan and Pakdaman paper and have additional weaknesses.

In discussing our findings, we will draw on a wider critical literature related to the conduct and value of systematic reviews in medicine and the health sciences.[2] Ioannidis (2016, p. 486), for example, raises concerns about the 'mass production' of systematic reviews and concludes: 'The production of systematic reviews and meta-analyses has reached epidemic proportions. Possibly, the large majority of produced systematic reviews and meta-analyses are unnecessary, misleading and/or conflicted.'[3]

Møller et al. (2018, p. 520), go further and question whether systematic reviews and meta-analyses are a useful form of research: 'An evaluation of the landscape of current systematic reviews and meta-analyses suggests that many of them are focused on unimportant questions, many are redundant and unnecessary, a sizeable proportion are flawed beyond repair, and eventually only about 3% of them are both well done and clinically useful.'

Kolaski et al. (2021, p. 10) have conducted a remarkable study of 83 systematic reviews of interventions for children with cerebral palsy, assessed using the AMSTAR-2 appraisal framework,[4] and conclude that most of the reviews were 'unreliable.' They say: '… even in recent years when guidelines for sound conduct and reporting of systematic reviews are readily available, most summaries of evidence in systematic reviews about interventions for children with CP continue to be untrustworthy.'

And Negrini et al. (2021, p. 1) in a commentary on the Kolaski et al. paper acknowledge the 'bleak picture' they paint, but reaffirm the value of Cochrane style reviews and appeal for: 'More rigorous literature searches, standardised application of risk of bias tools and analyses and reporting of results that incorporate quality appraisal…'

Fancourt and Finn (2019) based their World Health Organisation scoping review of research in arts and health on 'over 900 publications (…) of which there were over 200 reviews, systematic reviews, meta-analyses, and meta-syntheses covering over 3,000 studies, and over 700 further individual studies.' (p. vii) Given the conclusion reached by Kolaski et al. from their scrutiny of systematic reviews of treatments for children with cerebral palsy, and the fact that Fancourt and Finn did not appraise the quality of the systematic reviews they refer to, there is reason to be concerned about the validity of the large and growing number of systematic reviews in arts and health.

In the main body of this paper, we will first summarise the study of art therapy for adolescent girls attending an 'arts school' in Tehran, Iran (Bazargan and Pakdaman, 2016) before turning to a discussion of the coverage of this research in three subsequent systematic reviews. We will then offer a critique of the Bazargan and Pakdaman paper, arguing that it should not have appeared in these systematic reviews. We conclude with a broader reflection on the factors which help to explain the production and publication of uncritical systematic reviews.

YOUNG PEOPLE, ART THERAPY AND MENTAL HEALTH—THE NEED FOR ROBUST CRITIQUE

A Non-evaluative Summary of the Bazargan and Pakdaman Study

Bazargan and Pakdaman (2016) describe the purpose of their study as 'to determine the effectiveness of art therapy in reducing internalizing and externalizing problems of adolescent girls

[1]https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=193283

[2]Critical discussions of systematic reviewing can be found beyond medicine and the health sciences in the field of International Development (Mallett et al., 2012) and education (MacLure, 2005; Hammersley, 2020, see below).

[3]We are not claiming here that all systematic reviews and meta-analyses are flawed. Properly conducted, focused reviews and meta-analyses can serve an important function in summarising developments in a field of research, guiding improvements in healthcare and providing guidance for needed future research.

[4]A 37-item assessment instrument to assess the methodological quality of systematic reviews, building upon previous tools, empirical evidence and expert consensus. See Shea et al. (2007).

(14–18 years old)' attending an 'arts school'[5] in Tehran, Iran. 'Diagnosis of the problems' was based on a 'self-completion form' as part of the 'Achenbach System of Empirically Based Assessment' (ASEBA) (for a description see: Achenbach, 2019). 'Internalizing problems' involve 'symptoms' including 'anxiety/depression, withdrawal/depression' and 'somatoform complaints.'[6] 'Externalizing' problems, in contrast, include 'rule-breaking and aggressive behaviours.'[7] Thirty girls who scored at or beyond two standard deviations above the mean on the internalizing 'symptom scales' and below +1.3 standard deviations on the externalizing scales were identified as 'internalizing' and randomised into either the art therapy or control group in the study. In addition, 30 girls who scored at or above 1.3 standard deviations on the externalizing scales, but below two standard deviations on the internalizing scales, were identified as 'externalizing' and similarly randomised to either art therapy or the control condition in a parallel trial. Art therapy consisted of 61 and a half hour sessions in small groups (group sizes not given) led by an art therapist, in which girls painted and then had the opportunity to discuss what they had produced. No details are given of the activity engaged in by the control groups. Following the programme of art therapy, the girls completed the Achenbach self-completion forms for a second time. The authors report that 'our results showed that Art therapy significantly reduced internalizing problems (…); however, its effect in reducing externalizing problems was not significant (…)' (p. 51).

The Inclusion of the Bazargan and Pakdaman Study in Subsequent Reviews

The Bazargan and Pakdaman study is included in three systematic reviews concerned with the potential value of arts therapy for children/adolescents described as 'vulnerable' (Ponomarenko et al., 2017), or in five 'clinical' categories (Cohen-Yatziv and Regev, 2019) or with 'psychosocial problems' (Bosgraf et al., 2020). In each of these reviews, the reported findings from the Bazargan and Pakdaman study are accepted at face value, with little critical appraisal and commentary.

Ponomarenko, Yap and Peeran (2017)

The purpose of this review, published in the United Kingdom by the highly respected Thomas Coram Foundation for Children, was to evaluate 'the existing quantitative evidence base on the impact of delivering music therapy and art therapy to vulnerable children and young people' (Ponomarenko et al., 2017, p. 10). The substantive focus of the review is on 'the types of cases most commonly dealt with by art and music therapists working with vulnerable children in the United Kingdom' (p. 12). Based on experience at Coram, the following list was compiled and used as search terms for the review (p. 15):

- attachment disorders/parent–child bonding issues and/or early relational trauma;
- trauma;
- grief and bereavement;
- anxiety;
- speech, language and communication difficulties;
- behavioural and social interaction difficulties;
- low self-esteem;
- autistic spectrum disorders;
- concentration and learning difficulties; and
- adopted children.

A variety of databases and journals were searched to identify reports published from 2000 onwards for inclusion in the review. The Scientific Maryland Scale (SMS) was used to judge the quality of each study on a five-point scale, with a grade of 5 given to randomised controlled trials.[8]

A total of 896 papers were identified from the initial searches. These were reduced to 430 after removing duplicates and papers that did not match the inclusion criteria. Of the 430 only 61 could be rated against the SMS, and only papers graded at 2 and above were included leaving 51 papers for the review – 14 of which related to art therapy and 37 concerned music therapy.[9]

One of the 14 studies of art therapy included is that reported by Bazargan and Pakdaman (2016). The authors take Bazargan and Pakdaman's account of their findings at face value and offer no critique, although they do acknowledge that Bazargan and Pakdaman identify limitations to their study. One noteworthy issue in the review is that the study is given an SMS rating of '3' rather than '5' which as a randomised controlled trial it arguably deserves.[10]

Cohen-Yatziv and Regev (2019)

The purpose of this systematic review was to assess 'the effectiveness of art therapy in a wide range of child-aged clients'[11] (Cohen-Yatziv and Regev, 2019, p. 100). Four electronic databases were searched for quantitative studies on art therapy

[5]We have been unable to find any information online on the character and curriculum of Iranian 'art schools.' We assume, however, that such schools promote Islamic values, are single-sex and train students in traditional Iranian arts and crafts (see: https://surfiran.com/arts-crafts-iran/).

[6]Note that these three symptom clusters are distinct, but it can be assumed given the cut off point for inclusion of 'internalising' girls in the study, that they reported all three forms of difficulty.

[7]Note that these two symptom clusters appear very different, and girls may be 'rule-breaking' without being 'aggressive' and vice versa. However, given the cut off point for inclusion of 'externalising' girls, it can be assumed that they reported both forms of behaviour.

[8]Details of the Scientific Maryland Scale are given in Appendix A of the report. The original source for the scale, oddly, is an American report on research in preventing crime: Sherman et al. (1998). Preventing crime: What works, what does not, what's promising. Report to the U.S. Congress, Washington, DC.

[9]No details are given of the process and reliability of rating sources against this scale.

[10]An explanation of this rating may be that Pnomarkenko et al. regard the Bazargan and Pakdaman study as 'quasi-experimental' (p. 77). Bazargan and Pakdaman confusingly describe their study as 'semi-experimental' most likely in referring to the comparison made between the effects of art therapy for the internalising and externalising groups of girls involved in the study. Within these separate samples, however, girls were randomly assigned and so, in fact, the paper reports two separate trials taking place in parallel.

[11]Note the language used. Why 'child-aged clients' rather than just 'children?'

for children from 2000 to 2017. Thirteen articles were identified[12] and categorised according to their 'level of evidence' as: 1, randomised controlled trials, 2 non-randomised two-group studies and 3 non-randomized one-group studies (p. 101). Studies were also grouped according to the issues addressed through the therapy: trauma, special education and disabilities, no specific diagnosed difficulties, medical condition and juvenile offenders (p. 103–104).

The Bazargan and Pakdaman paper is included in this review under the heading of 'no specific diagnosed difficulty' despite the way in which Bazargan and Pakdaman characterise the girls involved as being at the high end of the internalising and externalising distributions. Details of the study are given in Table 3, where it is described as level 1 (p. 108). The study is also briefly mentioned in the text on p. 104 along with two other studies of art therapy with children who had 'no specific diagnosed condition' conducted after 2000. They sum up the findings from these studies as showing that: 'art therapy may help children who are not diagnosed with specific difficulties but are faced with a variety of challenges in life' (p. 104), but neglect to mention that they involve very different participants: siblings of paediatric stem cell transplant patients; persistent asthma requiring daily treatment and adolescent girls with internalising and externalising problems.

As with the Ponomarenko et al. study, therefore, Cohen-Yatziv and Regev simply take the findings reported by Bazargan and Pakdaman at face value and offer no discussion of the details of their research and its potential problems.

Bosgraf, Spreen, Pattiselanno and van Hooren (2020)

Bosgraf et al. (2020) conducted what they characterise as a 'systematic narrative review' in order to give an overview of art therapy interventions for children and adolescents with psychosocial problems. Fourteen databases and four electronic journals up to January 2020 were systematically searched. The 'applied means and forms of expression', therapist behaviour, supposed mechanisms of change and effects of therapy were extracted and coded. Thirty-seven studies out of 1,299 studies met the inclusion criteria.[13] These included 16 randomised controlled trials, eight controlled trials and 13 single-group pre–post design studies.

The quality of the studies was assessed by two researchers (LB and KP) applying the 'Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies' (Thomas et al., 2004)[14] which has eight categories: selection bias, study design, confounders, blinding, data collection methods, withdrawal and dropouts, intervention integrity and analysis. Independent of each other, they came to an opinion and then discussed their ratings to reach an agreement. Once the assessment was completed, each examined study received a mark ranging between 'strong,' 'moderate,' and 'weak.'

Art therapy interventions for children and adolescents varied in terms of materials/techniques used and the extent to which therapist structured the activity. Three forms of therapist behaviour were distinguished: non-directive, directive and eclectic.

The Bazargan and Pakdaman study is described in each of two tables in the paper. Table 1 provides the descriptive details of the study, as was found in the previous two systematic reviews. In addition, the 'quality assessment' is described as 'strong' but no specific details are given in the paper on how the authors arrived at this rating.[15]

Table 2 reports on the characteristics of the art therapy employed in the Bazargan and Pakdaman study and provide details on the supposed mechanisms through which the activity of painting and discussion served to be therapeutic. Bosgraf et al. characterise these mechanisms, in note form, as follows:

> Reveal what they have inside; leads to new activities and enhances experiences; provides an individual with opportunities through which they can freely express their feelings, affections, needs, and knowledge; achieving a feeling of security toward unpleasant memories of a traumatic event; emotions and thoughts are influenced by conflicts, fears, and desires, and painting allows patients to express them symbolically; offering opportunities to regain a sense of personal agency; explore existential concerns; reconnect to the physical body (p. 14).

What is remarkable, however, is that nowhere in the Bazargan and Pakdaman paper do they show that these putative processes took place for the girls in the study. Bosgraf et al. draw on the theoretical, broadly psychoanalytic, account Bazargan and Pakdaman offer in their introduction.

As with the two previous systematic reviews, therefore, we conclude that Bosgraf et al. fail to undertake a careful critical reading of the Bazargan and Pakdaman paper and are content to accept their account of what they did and the results they observed.

Bazargan and Pakdaman, 2016 – A Robust Critique

Having considered the uncritical treatment of the Bazargan and Pakdaman paper in three recent systematic reviews, we now return to this study and offer a detailed critique. There are at least six problematic features of the Bazargan and Pakdaman study. Taken together, our judgement is that this paper should have been excluded from the systematic reviews considered,

[12]The research studies identified are almost identical to those located by Ponomarenko et al. (2017).

[13]Many more studies are identified compared with the two previous reviews as more databases are searched and a longer time span is considered.

[14]The quality assessment tool can be found here: EPHPP – McMaster Evidence Review & Synthesis Centre (merst.ca).

[15]This is a considerable weakness in Bosgraf et al.'s review. Despite employing a more appropriate quality assessment tool than both earlier reviews, it is disappointing not to see the details of their assessment. Bazargan and Pakdaman, for example, do not discuss 'blinding' and as we will see below there are substantial problems with 'intervention integrity' and 'analysis.'

and it will not be included in the review we are currently undertaking.

Questionable View of Mental Health Challenges and Causal Ontology

An increasing body of literature is critical of the role of psychiatry and psychology in 'categorising' and 'labelling' people with mental 'disorders' (see for example: Gambrill, 2013; Kinderman et al., 2013, 2017; Johnstone et al., 2018). In the Bazargan and Pakdaman paper a questionable view of mental health challenges is reflected throughout in the use of language. For example, the word 'problem' is used no fewer than 77 times in the paper, and 'disorder' is used seven times. Also, the girls in the study are repeatedly referred to as 'subjects' (18 times) and the art therapy activity is described as an 'intervention' (11 times).[16] A further indication of the reification of mental health 'problems' in categorising the girls as 'internalising' or 'externalising' is the fact that no details are given on any aspect of the girls' circumstances or specific experiences. If the 'internalising' girls are depressed, anxious, withdrawn or showing psychosomatic 'complaints' it is surely important to understand why these challenges have arisen and what sustains them.

There is also a view inherent in the research design that the art therapy 'intervention' has a causal 'effect' on the girls' mental health, without any reference to the role of their active engagement or agency in the process. There is, however, an acknowledgement of the agency of some girls, especially those with so-called 'externalising' 'problems', in their resistance to taking part in the 'therapy' sessions (see the next section).

Lack of Trial Registration, Ethical Review and CONSORT Diagram

The first issue to point out about this paper, as a report of two parallel randomised controlled trials, is that there is no indication that the protocol for the study was lodged with a trial register. For virtually all academic journals reporting on trials, this is an essential requirement for publication,[17] although clearly it was not a requirement to publish in the *Archives of Iranian Medicine* in 2016. In addition, there is no indication in the published paper that a protocol was subject to ethical scrutiny by an appropriate committee within the authors' institution.[18] There are indeed questions over the ethical character of this study, especially with respect to 'informed consent.' Given that participants were aged between 14 and 18 years, many of them were minors and consent would be required both from parents and the children/young people themselves. There is no account provided, however, on whether consent was obtained. In fact, there are indications that girls may have been 'required' to participate given that the arts therapy sessions took place in school and during school hours (p. 53). More worryingly, for the girls with 'externalising problems' the authors state that:

> … individuals in our study attended the sessions reluctantly and hence the required therapeutic relationship between the therapist and clients was rarely and barely established (p. 55).

This is an astonishing admission and surely undermines the credibility not only of the 'externalising' trial but the entire study.

A further omission in the paper is the lack of a CONSORT diagram, which would clearly specify the number of participants at every stage of the trial process – including the numbers of girls assessed in total before the selection of the sample, and the numbers lost to the trail during the intervention phase and afterwards.

Unclear Account of the Selection of Participants

A major concern with this study is the confusion that arises in the description given of how girls were identified as 'internalising' or 'externalising.' While it might appear straightforward from the summary given above, the precise procedures employed are not given, and inconsistencies arise in the text on the procedure, and between the account of the method and the data reported in the results section. To fully explain these points, it is necessary to quote at length from their account of the criteria used to identify the samples and the ASEBA:

> Using targeted sampling, 30 students with internalising problems were selected and randomly assigned into experimental and control groups. Similarly, 30 students with externalising problems were chosen and randomly assigned to experimental and control groups. The selection process was based on students' scores in the ASEBA considering test cut points (+2 standard deviations from the mean for internalising problems and + 1.3 standard deviations from the mean for externalising problems; p. 52).

This is straightforward and clear, but then they go on to say:

> The main entry criteria the final sample for internalizing groups (experimental and control) was gaining a score equal or above +2 standard deviations in internalizing problems while having a score below +1.3 standard deviations in externalizing problems. The main entry criteria for externalizing groups (experimental and control) was gaining a score equal or above +1.3 standard deviations in externalizing problems while having a score below +2 standard deviations in internalizing problems (p. 52).

[16]The term 'intervention' is considered inappropriate in the context of creative arts therapies as it implies an action 'done to' participants, rather than a process of active engagement by participants. The broader principle is 'Nihil de nobis, sine nobis.' See: https://en.wikipedia.org/wiki/Nothing_About_Us_Without_Us

[17]For a discussion of the requirements of trial registration see: https://www.biomedcentral.com/getpublished/writing-resources/trial-registration

[18]Current guidance for publication in the *Archives of Iranian Medicine* specifies that controlled trials should be registered and subject to review: http://www.aimjournal.ir/InstructionsforAuthors

The picture then becomes even less clear in the following paragraph where it is claimed that scores from the ASEBA were 'turned into T scores.'

> To evaluate internalizing and externalizing problems, ASEBA was used. This self assessment questionnaire for adolescents includes 112 items and is normalized for 11 to 18 year-old individuals. The questions have been designed to evaluate emotional behavioral problems, social problems and desired social behaviors. The empirically based symptom scales include anxiety/depression, withdrawal/depression, somatoform complaints, rule-breaking and aggressive behaviours. The first three cases constitute internalizing problems and the last two constitute externalizing problems. The test scores range between 0–2. 0 = it does not apply to me; 1 = it is somehow and occasionally true for me; and 2 = it is completely and often true for me. Minimum and maximum scores for internalizing problems are 0 to 62, and for externalizing problems are 0 to 64. These scores were turned into T scores using a T-table. The clinical range for internalizing problems is T scores above 69 and for externalizing problems is T scores above 63 (p. 52).

To simplify the discussion, we will focus solely on the identification of girls with 'internalising problems.' The first thing to appreciate is that a cutoff point of +2 standard deviations means that the selected girls represent about the top 2.5% of the distribution if the ASEBA scores were approximately normally distributed. Thus, if they were selected by screening of the population of girls 14–18 in the school, a sample of 30 would imply that 1,200 girls were assessed but no details are given of the total number of girls screened as a basis for selection. However, the picture is more complicated because the internalising girls were not only at +2 standard deviations on the internalising scale but were also below +1.3 standard deviations on the externalising scale.

It appears, however, that the selection of the sample was based on normative data for the Achenbach scales as reference is made to the conversion of raw scores to T scores (standardised scores), with 'the clinical range for internalising problems is T scores above 69.' Unfortunately, this is entirely inconsistent with the statement that 'minimum and maximum scores for internalising problems are 0–62' – that is, the stated maximum score is below the stated cutoff point of 69.

The picture becomes more confused, when the reported data from the internalising trial are reported in Table 1 (p. 54), where it appears that the pre-test internalising mean for the total sample was 34.14. In other words, the average score for girls is in the middle of the stated range for the scale and is very much lower than the stated cutoff point for identifying 'internalising problems.'

Problems With Power and Unclear Randomisation Procedures

To their credit, Bazargan and Pakdaman do consider the issue of power in their study. They refer to the use of 'G-Power software' to calculate a required sample size, given an estimated effect size of 0.25 and specified alpha and beta values. The figure that emerges is 30 participants (15 in each arm of the trial), which corresponds to the sample size previously specified in their paper. However, no justification is given of the anticipated effect size, which is small, and there is no discussion of estimates of the 'minimum clinically important difference', for the measures used. What is important surely, is an effect size which represents a meaningful change as assessed by the Achenbach scales. A further point is that they assume that the 'correlation between repeated measures' will be 0.75, but do not consider explicitly the possibility of regression to the mean. Given that the girls selected were above the 97th percentile on the score distribution, it is very likely that on retest, their scores would be lower, due to scale unreliability.

With respect to the process of randomisation of participants in the trials, Bazargan and Pakdaman say that 'subject assignment into experimental and control group [was] accomplished by subjects names alphabetical sequence' (p. 52), but this is unclear and questionable as means of undertaking randomisation.

Limited Description and Appropriateness of the Therapeutic Programme

Bazargan and Pakdaman devote two short paragraphs describing 'the intervention package of Art therapy' (p. 53). They say that the girls participated in six painting sessions during the school day in groups of between 3 and 15. This means that some sessions involved all the girls in the trials, whereas others involved smaller groups and so must have been repeated during the week. Bazargan and Pakdaman state that each session lasted one and a half hours, with an initial introduction, 45 min to an hour of painting and then 'subjects had 15 min to talk with the therapist and other members about works, feelings, interests and events' (p. 53). This short period of talking appears to have involved the whole group, and it is not clear what kind of benefits individual girls would have gained from such discussions. The implausibility of therapeutic benefits becomes more obvious when we consider the account given in the introduction of the putative processes involved in art therapy. They say, for example, that participants involved in art therapy can achieve 'a feeling of security towards unpleasant memories of a traumatic event' and can express 'conflicts, fears and desires' symbolically and thereby 'regain a sense of personal agency' (p. 52). Such processes may well happen in arts therapy undertaken individually, and over many sessions, with a sensitive therapist, but it is very hard to envisage how this would have happened in a short series of group sessions with adolescent girls in a school setting.

Problems in the Presentation and Analysis of Results

In the results section, Bazargan and Pakdaman explain that there was some 'drop out of subjects through sessions and in the post-test phase' for the internalising group, resulting in 14 girls in the experimental group and 13 in the control group. However, no data on attrition is reported for the externalising

group. In addition, in Tables 1–3, which report the experimental results, no information is given on the final sample sizes. Figure 1 reporting on 'the interactive effect of group and evaluation time on the internalising problems' is also highly unsatisfactory, as no details are given of the scale on the *y*-axis (p. 53).

The statistical analysis performed on the pre-post data was 'mixed analysis of variance' and appears to be appropriately conducted, but some arcane details are given regarding tests applied to the data prior to this analysis, with reference to 'the sphericity assumption and homogeneity of error variance,' the lack of a need to perform the Mauchly test and the results from the Leven test[19] which showed 'that error variance values between groups in pretest and posttest were equal' (p. 54).[20] Such technicalities are confusing and of limited relevance, but a more serious problem is that close reading of this section shows that the statistics presented from the Levene test for both the internalising and externalising data are identical – with the same F and p values. This is entirely implausible and points to an error in reporting.

DISCUSSION

In this paper, we describe work undertaken as part of the process of conducting a systematic review of research on the role of arts engagement and art therapy with children and adolescents experiencing mental disorders (See 'Footnote 1'). At the time of writing, we are working on identifying potentially suitable research papers to include in the review. We have searched electronic databases and screened abstracts and obtained full text versions of papers for further detailed scrutiny. We have also consulted previous relevant systematic reviews for studies in the broader filed on young people, arts engagement/art therapy and mental health.

At this stage, however, we have concerns regarding the quality of the research literature and previously published systematic reviews, and we have explored these concerns through an examination of one study of art therapy (Bazargan and Pakdaman, 2016) and its inclusion in three systematic reviews.

What emerges is the uncritical nature of the systematic reviews considered in which review teams were content to take the findings reported by Bazargan and Pakdaman at face value and repeat their conclusions, with little discussion and no serious scrutiny of their methods and results. While we consider only the Bazargan and Pakdaman paper in detail, examination of the tables in the reviews summarising studies included, raises a concern that the same may be true of every study included in each review.

Further Comments on the Three Systematic Reviews

There is not enough space here to thoroughly compare and evaluate the three reviews considered in this paper. It would be a very time-consuming exercise. In the context of the present paper, it is also unnecessary as the central concern has been to consider the treatment of the Bazargan and Pakdaman paper in each of the reviews, which we have shown to be unsatisfactory. However, several critical points can be readily made about the reviews, and we do this in relation to the four 'distinctive methodological features of systematic reviews' as highlighted by Hammersley (2020): 'exhaustive searching for relevant literature; explicit selection criteria regarding relevance and validity; and synthesis of relevant findings' (p. 27).

All three reviews provide an account of their search strategies, inclusion/exclusion criteria and quality screening. These vary in detail and robustness and in the sources they utilise. What is striking about these reviews is the considerable diversity of the studies included, which leads the authors to divide the papers into categories dealing with different problems. In Ponomarenko et al. (2017), their report is structured as eight separate reviews according to the challenges facing the children/young people. Cohen-Yatziv and Regev (2019) follow the same strategy and report their review for five categories of issues addressed. Bosgraf et al. (2020), in contrast, organise their review according to the form of the art therapy and the role of the therapist.

The quality screening undertaken varies in each review, and the approach is either minimal (2017, 2019) or poorly reported (2020). In the 2017 and 2019 reviews the focus is simply on the design of the studies included and based on an uncritical assumption that RCTs provides 'good' evidence'.[21] In the 2020 review, a more thorough quality assessment is described and is said to have been undertaken by two members of the review team independently and then agreed, but the details of the screening are not reported. Given that the authors of this review give the Bazargan and Pakdaman paper a 'strong' rating (they claim to have found no weaknesses), the care taken in conducting screening is called into question, and we can only wonder at the quality of studies they considered 'weak.' This raises the question of why the authors of the 2020 review did not exclude studies they judged to be 'weak' from their review.

In relation to 'synthesis of relevant findings' – the picture is also rather weak, as all reviews point to the heterogeneity of existing research studies, which makes any generalisations difficult. This is acknowledged explicitly by Cohen-Yatziv and Regev (2019) who indicate that a 'meta-analysis' would be 'impossible':

> The findings described in this article emerge from the 13 studies that met the inclusion criteria. The decision to present these studies as a review rather than as a meta-analysis is due to the emergent nature of the field of art

[19]The authors refer to the 'Leven test' when they mean the test developed by Levene to test for equality of variance in two groups: https://en.wikipedia.org/wiki/Levene%27s_test

[20]This is poorly expressed by the authors, since the test can only serve to reject the null hypothesis, rather than support it.

[21]It should be acknowledged, however, that Ponomarenko et al. (2017) do provide a comprehensive listing of the weaknesses of the studies they review in their discussion (see p. 121 onwards).

> therapy. There is little research in the field, and the differences between studies and the indices are so great that it would have been impossible to produce a meta-analysis that would yield meaningful results (p. 103).

This statement is surely tantamount to saying that the corpus of studies is not amenable to synthesis through systematic review either.

A particularly important aspect of heterogeneity which is mentioned explicitly only by Ponomarenko et al. (2017), is the country where the study was conducted. The Bosgraf et al. (2020) paper is key to appreciating this challenge posed by studies coming from different countries, as it includes the largest number of studies. Of the 37 studies they include, a majority were undertaken in the United States (21), followed by Iran (7), Canada (2), Israel (2) and South Korea (2), and one each from South Africa, India and Germany. It is surely problematic to attempt to synthesise findings from studies conducted across such a wide range of different cultures.

Further Factors Affecting the Quality of Reviews

Both Hammersley (2020) and Ioannidis (2016) offer interesting insights into why reviews can be unsatisfactory and uncritical.

Hammersley (2020) makes pertinent comments about the time involved in carrying out systematic reviews, and the need to balance resources devoted to each of these key elements. It may be that if disproportionate time is devoted to ensuring that the search is systematic and comprehensive, then less time is available for quality screening. Systematic reviews are undoubtedly onerous and require significant skills in critical reading, sustained concentration and careful negotiation within a review team to ensure that judgements made about the quality of studies (their strengths, limitations and weaknesses) and their findings are inter-subjectively agreed as accurate. As a great deal of time and effort is put into searching and selecting studies, and quality screening, reviewers may feel their work is done once the PRISMA flow chart is complete and that all that remains is to summarise the studies and attempt some form of narrative synthesis.

Ioannidis (2016) also makes interesting observations regarding the 'vested interests' of academics and the impact these have on the conduct of systematic reviews and meta-analyses. In his view:

> Ideally, people who have no stake in the results should perform systematic reviews and meta-analyses, excluding not only those with financial conflicts of interest but even those who are content experts in the field. According to this line of argument, content experts can and should be consulted, but they should not be authors (p. 495).

His discussion raises a key question that needs to be asked of academics in the field of arts and health conducting reviews: Is the starting point of a review team one of 'dispassionate enquiry and scepticism' or is there a pre-established conviction that the arts have benefits for health and wellbeing? If the former, a review team may interrogate research methods and findings closely in the interests of establishing the truth or otherwise of claims made. If the latter, a review may be undertaken with the purpose of showcasing positive evidence. A further concern may be to advocate for supportive policy development, further funding for research and the practical implementation and wider scaling up of arts for health programmes.

This issue is a palpable potential source of bias in the Cohen-Yatziv and Regev (2019) review, as they acknowledge they are art therapists: 'In the initial screening stage, both authors (who are certified art therapists) reviewed the abstracts to eliminate those that did not meet the research objectives' (p. 102). The issue of 'vested interests' also extends to the process of acting as a reviewer for manuscripts submitted to a journal for publication. Regev, for example, is the sole reviewer named for the Bosgraf et al. (2020) review, which cites the Cohen-Yatziv and Regev (2019) review and an empirical paper by Regev and Guttmann (2005).

CONCLUSION

Two conclusions emerge:

Firstly, the existing literature on young people, art therapy and health, included in the reviews considered, is so heterogeneous in multiple respects and limited in extent, that it is not amenable to systematic reviewing in a strict sense. And secondly, the reviews discussed are flawed due to forcing this literature through the 'Procrustean bed'[22] of systematic reviewing, compounded by a signal lack of robust critical scrutiny of the little evidence that does exit.

As a team, we need to consider whether we proceed with a systematic review of young people, arts engagement and mental health, as outlined in our current protocol; or whether we explore alternative models of reflecting on what can be learned from the existing body of evidence and practice. To assist us in addressing options, we will repeat the exercise described in this paper focusing on widely cited research on music therapy for children experiencing anxiety issues (Goldbeck and Ellerkamp, 2012), and the treatment of this research in no fewer than three recent meta-analyses (Geipel et al., 2018; Bear et al., 2020; Lu et al., 2021).

AUTHOR CONTRIBUTIONS

KG-H conceived and designed the systematic review of research on effects of arts-based programs for mental health in young people. SC, YI, LT-H, AB, and AKS-W contributed to the review design. AKS-W and KG-H search for studies through databases and systematic reviews and obtained full text papers and organised them alphabetically. SC search Google Scholar to identify citations

[22]https://www.merriam-webster.com/dictionary/procrustean%20bed

of potentially relevant papers in subsequent publications and drafted and wrote the manuscript with support from other authors. KG-H and SC have screened abstracts for relevance. All authors were involved in the final drafting of the manuscript and provided critical feedback on the basis of their special areas of interest, which were incorporated into the final draft of the manuscript and approved the submitted version.

FUNDING

KG-H and AKS-W were supported by Land Salzburg. The open access publication costs for article will be covered by University Mozarteum Salzburg. The funders had no role in the conceptualisation, design, literature searches, analysis, interpretations, preparation of the manuscript or decision to publish.

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frontiers in Psychology

BRIEF RESEARCH REPORT
published: 28 February 2022
doi: 10.3389/fpsyg.2022.731264

More Than Movement: Exploring Motor Simulation, Creativity, and Function in Co-developed Dance for Parkinson's

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OPEN ACCESS

Edited by:
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Reviewed by:
Lauren Stewart, Goldsmiths, University of London, United Kingdom
Maria Luisa Rusconi, University of Bergamo, Italy
Madeleine E. Hackney, Emory University, United States

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *26 June 2021*
Accepted: *19 January 2022*
Published: *28 February 2022*

Citation:
Bek J, Arakaki AI, Derbyshire-Fox F, Ganapathy G, Sullivan M and Poliakoff E (2022) More Than Movement: Exploring Motor Simulation, Creativity, and Function in Co-developed Dance for Parkinson's. Front. Psychol. 13:731264. doi: 10.3389/fpsyg.2022.731264

Dance is an enjoyable, non-therapy-focused activity that may provide a range of benefits for people with Parkinson's. The internal simulation of movement through observation, imitation, and imagery, is intrinsic to dance and may contribute to functional improvements for people with Parkinson's. This study explored the feasibility and potential benefits of a dance program designed by a collaborative team of dance artists, researchers, physiotherapists, and people living with Parkinson's. The program incorporated motor simulation through observation, imitation and imagery of movement, supported by creative themes, expression, and music. A 6-week pilot trial of the program was conducted with 10 people with Parkinson's. A focus group following the trial (N = 8) provided insights into the use of imagery, observation and imitation within dance, and the link between creativity and functional outcomes, as well as indicating multidimensional benefits of dance as reported in previous studies. Exploratory outcome measures also suggested potential effects on motor simulation, functional dexterity, and quality of life. The present study demonstrates the feasibility of a co-developed dance program for Parkinson's and indicates how creative elements of dance may support functional outcomes. Future research should examine the role of motor simulation processes in dance for Parkinson's, including the potential to develop transferable cognitive-motor skills. This study also highlights the value of collaborative partnerships in designing dance for health programs, which may optimise beneficial effects by using creative approaches to incorporate evidence-based elements, with guidance from individuals with lived experience to ensure the relevance to their goals.

Keywords: Parkinson's disease, dance and movement, neurorehabilitation, motor imagery, alternative therapies

INTRODUCTION

Parkinson's disease is the fastest growing neurological condition worldwide (Dorsey et al., 2018). Symptoms include progressive movement difficulties such as slowness, rigidity, tremor, and problems with balance and walking. There are also more subtle effects, such as difficulties with hand movements (dexterity; Foki et al., 2016), gestures (Cleary et al., 2011), and facial expressions

(Bologna et al., 2013). Further to these motor impairments, Parkinson's also causes a range of cognitive, affective, and behavioural changes (Schapira et al., 2017). Both motor and non-motor symptoms can impact significantly on activities of daily living and independence. There is currently no cure for Parkinson's, and treatment typically involves medication to increase levels of dopamine in the brain. While medications can be effective, they do not address all symptoms and can have debilitating side-effects, necessitating the exploration of alternative, non-pharmacological approaches to enable people to live well with Parkinson's (Li et al., 2016).

Dance involves multiple elements (including cognitive and motor skills, creativity, expression, and rhythm) that may contribute to positive effects for people with Parkinson's (Dhami et al., 2015). Importantly, levels of physical activity (van Nimwegen et al., 2011) and motivation to exercise (Afshari et al., 2017) are reduced among people with Parkinson's, yet high levels of adherence and motivation are found for dance (Houston and McGill, 2013; Sharp and Hewitt, 2014), reinforcing its potential as a sustainable option to help maintain health and wellbeing. Participants and instructors of dance for people with Parkinson's have described the importance of the aesthetic experience of dance (Rocha et al., 2017; Fontanesi and DeSouza, 2021), while participants also consider addressing motor symptoms to be an important outcome (Rocha et al., 2017). The creative experience and non-therapeutic focus of dance, alongside its potential to improve movement, may result in higher levels of acceptance and motivation relative to other therapeutic activities and exercise programs for people with Parkinson's.

Beneficial effects of various styles of dance (including Ballet, Tango, Irish, modern, and mixed styles) have been found in people with Parkinson's, with systematic reviews and meta-analyses reporting positive effects, particularly in sensorimotor outcomes such as balance and gait (Sharp and Hewitt, 2014; dos Santos Delabary et al., 2018; Kalyani et al., 2019; Carapellotti et al., 2020). While the majority of quantitative studies have focused on physical outcomes, qualitative research also indicates a range of psychosocial benefits of dance for people with Parkinson's, such as increased confidence and social participation, which may further contribute to its sustainability as a therapeutic activity (e.g., Westheimer, 2008; Foster et al., 2013; Houston and McGill, 2013; Westheimer et al., 2015; Bognar et al., 2017; Rocha et al., 2017; Zafar et al., 2017). However, most studies have not examined the effects of dance on everyday functional tasks and communication, or the potential to develop transferable cognitive-motor skills through dance.

There is increasing interest in understanding the mechanisms by which dance produces positive outcomes for people with Parkinson's. The use of music within dance for people with Parkinson's likely has a key role in supporting movement in a number of ways, including rhythmic stimulation and movement priming and cueing (Thaut and Hoemberg, 2014; Rocha et al., 2017; Ghai et al., 2018; Rose et al., 2019) as well as having emotional, motivational, and cognitive effects (Pacchetti et al., 2000; Karageorghis et al., 2020; Krotinger and Loui, 2021). It has also been hypothesised that the internal representation of movement in dance – through observation, imitation, and imagery – may contribute to some of the reported benefits for people with Parkinson's (Bek et al., 2020). Observing and imagining movement (referred to as *action observation* and *motor imagery* in the cognitive neuroscience literature) activate frontoparietal brain areas that are involved in motor preparation and execution (Hardwick et al., 2018). These processes are intrinsic to dance, since dancers use observation and imitation to learn from and interact with others, and imagery to enhance movement quality (e.g., Blasing et al., 2012; Batson and Sentler, 2017). Dance may also influence the ability to imagine movements (Jola et al., 2011; Bar and DeSouza, 2016). Evidence from laboratory and intervention studies indicates that action observation and imagery can facilitate movement in people with Parkinson's (Abbruzzese et al., 2015; Caligiore et al., 2017; Bek et al., 2018; Temporiti et al., 2020), with motor imagery described as a form of cognitive cueing (Keus et al., 2007). Dance may provide a more engaging and motivating context in which to develop and implement motor simulation skills than task-specific training (Bek et al., 2020), potentially offering a sustainable option for cognitive-motor rehabilitation. However, although dance programs designed for Parkinson's frequently utilise imitation (or "mirroring") and imagery (e.g., Hackney et al., 2007; Houston and McGill, 2013), the mechanistic role of these ostensibly aesthetic elements has received little research attention.

In summary, dance is a potentially sustainable activity within which to develop and apply cognitive-motor skills via imagery and imitation, which may contribute to functional benefits for people with Parkinson's. To further optimise engagement and motivation, the present study involved people living with Parkinson's in the development of a dance program, embedding motor simulation exercises within a creative framework in a way that aimed to preserve the aesthetic experience. The importance of co-developing interventions for health and physical activity is widely acknowledged (Donaldson and Finch, 2012; Buckley et al., 2018), and more specifically the value of involving people with Parkinson's in the development process has been reported (Quinn et al., 2010; Bek et al., 2016). This interdisciplinary project drew upon knowledge from cognitive neuroscience, physiotherapy, dance for health, and lived experience of people with Parkinson's, to explore the feasibility and potential outcomes of a co-developed dance program incorporating motor simulation processes through creative elements of dance.

METHODS

The study consisted of a co-development phase, a pilot trial, and a focus group with participants from the trial.

The Co-development Process

The project team included researchers, dance artists and facilitators, physiotherapists and four individuals living with Parkinson's, one of whom had an established relationship with the researchers as a patient and public involvement collaborator (MS). The researchers had previously attended and participated in dance classes for people with Parkinson's to obtain initial insights into the experience.

The dance program was co-developed through a series of group discussions and practical sessions. The development sessions and dance classes took place at a local community arts centre, which was considered to provide a more neutral and conducive environment than a university venue or professional dance studio. Influences were drawn from English National Ballet's (ENB) established Dance for Parkinson's initiative and the classical Indian style Bharatanatyam. While various different types of dance have been associated with benefits for people with Parkinson's, as noted above, Ballet and Bharatanatyam involve elements that were expected to promote motor simulation through imagery and expression. The ENB Dance for Parkinson's model uses imagery to evoke different movement qualities, as well as communication through story-telling (Houston and McGill, 2013). Bharatanatyam is a highly expressive dance form, which also strongly features story-telling, and utilises expressive facial movements and gestures (Ponmanadiyil and Woolhouse, 2018). Recent research has suggested the potential of Bharatanatyam to provide therapeutic effects and improve coordination, concentration, and expression (Shenoy and Kumar, 2019).

An important part of the development process was to identify and connect with themes to promote imagery and creativity within the dance classes. Dance is often influenced by the visual arts (e.g., Meglin et al., 2017), and to facilitate collaboration in the creative process, the development work included a visit to a gallery where team members (people with Parkinson's, dance artists, physiotherapists, and researchers) selected and discussed artworks and exhibits as the basis for choreographic themes. A particular insight was prompted by images of spliced and obscured faces (by John Stezaker), which led to discussion of how facial expressions are affected by Parkinson's (hypomimia), and as one individual with Parkinson's noted "what's in your head isn't showing on your face." Parkinson's can also impair the ability to recognise emotional expressions in others, which may be related to difficulty in producing expressions (Bologna et al., 2013). Other individuals' comments reinforced the importance of maintaining the ability to communicate non-verbally through expressions and gestures, which became a focus in the design of motor simulation exercises within the dance classes. A theme was developed around works from the gallery that linked to the local cotton industry, with complementary narratives and music evoking the environments of the cotton mill (e.g., machinery, weaving, textiles) and the Indian jungle (e.g., trees, animals, exploring the environment). The themes and music, as well as visual stimuli (images of textiles and prints from the gallery) and props including coloured scarves and handbells (see **Figure 1**), were incorporated to support imagery of different movement qualities.

In developing content for the classes, the dance artists emphasised the importance of preserving creative and aesthetic aspects of the experience, and the need for the research protocol to be sensitive to this. Motor simulation exercises with imitation and imagery were introduced subtly to avoid drawing attention to the research agenda (**Figure 1**). This was achieved through methods such as (i) projecting images from the gallery visit onto the theatre wall during classes as a stimulus for imagining different movement qualities; (ii) designing exercises to embed communicative gestures and expressions drawing upon imagery; and (iii) discreet imitation or *mirroring* by choosing someone in the opposite line to copy, or "passing on the movement" in a circle. The team members with Parkinson's stressed the importance of balancing functional benefits with the opportunity to enjoy a creative experience that did not explicitly focus on their condition. The creativity, themes, and imagery were noted to help distinguish dance from "just sitting doing exercises." The need for repetition and challenge to enable learning and progression was highlighted (see also Houston and McGill, 2013; Rocha et al., 2017), alongside some concerns about safety and confidence during particular movements involving balance or changes in rhythm or direction. It was also suggested that layers of complexity should be built up over time. For example, one individual noted that learning new movements initially demanded his full attention, and that appreciation of the music and using imagery would come later.

Participants

The program was piloted with 10 individuals (7 females) aged 50–71 years with mild to moderate Parkinson's (Hoehn and Yahr stages 1–3). Three of these participants had also been involved in the development process described above. The spouse of one participant (who did not have Parkinson's) also joined in the classes with the agreement of the other participants, but was not included in the assessments. Two participants (1 female) were unable to attend the post-trial assessment and focus group due to unrelated health issues. The study was approved by the University of Manchester Research Ethics Committee and all participants provided written informed consent.

Pilot Trial and Focus Group

The pilot program was delivered in 6 weekly classes of 60–75 min, in which participants were encouraged to contribute further to the choreography, and adaptations were offered for those remaining seated. Classes were followed by refreshments and social time, providing an opportunity for participants to ask questions and share feedback with the research team.

Feasibility of the dance program was assessed in terms of attendance and adverse events, as well as qualitative data from the focus group. Exploratory outcome measures were collected in the university laboratory before and after the 6-week pilot (within 7 days before the first session and after the final session). To explore whether dance participation may influence the ability to imagine movements and to simulate observed movements, which could potentially be applied outside of the dance class to aid movement in everyday life, the following measures were included: (i) a motor imagery vividness questionnaire (KVIQ; Malouin et al., 2007) which is validated for people with Parkinson's (Randhawa et al., 2010), and (ii) a task designed to examine embodiment of observed actions, in which participants observed short videos of dance movements while their eye movements were recorded using an eye-tracker (Eyelink 1000 Plus; SR Research Ltd.), and then rated the extent to which they experienced the "feeling" of the movement on a five-point scale. To explore potential

Motor simulation processes	Related exercises
Communicating through gestures and expressions	▪ "My name is" exercise – using a hand gesture to introduce yourself to the next dancer in the circle ▪ "Travelling through the jungle" – using gestures and facial expressions to share imagined experience
Imitating others' actions	▪ Mirroring in pairs ▪ Imitating someone in the opposite line ▪ "Passing the movement" – passing on and altering a movement within the circle (e.g., needle and thread)
Imagining different movement qualities	▪ Using coloured Indian scarves to explore different ways of moving together (e.g., "weaving") ▪ Projection of images from the gallery as a visual stimulus to support imagery

FIGURE 1 | Examples of how motor simulation was promoted within the dance classes by incorporating imagery and imitation into creative exercises (photography: Chris Currie).

functional improvements, a self-report measure of dexterity for everyday activities (DextQ-24; Vanbellingen et al., 2016) was included, that has shown preliminary evidence of improvement following home-based motor simulation training in Parkinson's (Bek et al., 2021a). Finally, health-related quality of life was measured using the Parkinson's Disease Questionnaire (PDQ-39; Peto et al., 1995).

Following the trial, a focus group with participants further explored feasibility through topics such as views on different elements of the classes and perceived physical and non-physical effects. The focus group was facilitated by two members of the research team who were not involved in recruitment or collecting outcome measures (AA, EP).

The focus group was transcribed by a professional transcription service. Themes and sub-themes were identified using a combined hypothesis- and data-driven thematic analysis approach (Braun and Clarke, 2006), with the aim of exploring specific topics (experience and enjoyment of classes, motor simulation, and potential benefits) while also allowing for other aspects of participants' experience to emerge. The transcription was coded first by one of the authors (AA); codes and initial themes were then reviewed by a second author (JB), and themes were further refined and finalised through discussions with a third author (EP).

RESULTS

Feasibility and Exploratory Outcomes

The number of participants attending classes each week ranged from 6 to 9, with 7 participants attending at least 5 out of 6 classes. Non-attendance was attributed to unrelated medical appointments and other commitments. No adverse events were reported during the trial.

Statistical analysis of the exploratory pre/post outcomes was not performed because of the small sample size, but descriptive data are provided in the **Supplementary Material**. There was no evidence of change in self-reported motor imagery vividness (KVIQ; median −0.54%). Participants rated their sense of embodiment ("feeling") when watching dance video clips more highly (median 9.8% change) after the dance trial, and an increase in the amplitude of saccadic eye movements (median 14.7%) suggested potential changes in how movements were observed. Change scores on self-report measures indicated potential improvements in functional dexterity (DextQ-24; median 8.9%) and quality of life (PDQ-39; median 29.8%).

TABLE 1 | Themes generated from the post-trial focus group (participant numbers are provided after quotes where these were available from the transcript).

Theme 1: The impact of creativity and imagery

Participants valued being involved in a creative process that they were able to enjoy without focusing on their condition, which provided a different experience compared to typical forms of exercise.

I like the fact it wasn't explicit. . . I really wanted it to be like an exercise class that's going to help to do this, it was woven in very cleverly and made you just feel like you were creating something and enjoying it, and just being immersed in it, rather than this will do you good. [F7]

It was suggested that the creative aspects of dance could contribute to physical benefits. One individual found that imagining and using hand gestures learned during the trial had enabled them to control their movements better when communicating and performing everyday tasks:

I thought the combination of music and the background and the story telling and all that, I loved the fact it was very creative using your imagination and yet actually physically some of the things that you did unknowingly helped me.

The lotus flower thing. . . it does it helps me in my job the way that I hold my hands. . .because I've got to present a lot of things. It stops me shaking when I do it, I don't know why or when I unscrew bottles I think about it. [F7]

Theme 2: Using observation and imitation to support movement

Participants reported a sense of embodiment through observing and imitating the instructor's movements, such as the intricate hand gestures (mudras):

She was so beautiful with her hands wasn't she? I felt watching her that I was doing it like she was, I probably wasn't, none of us probably were, but. [F3]

The subtle use of imitation encouraged participants to explore different movements without feeling under pressure:

I'd seen one of them doing something. . .you sit there thinking I can't do that but I can have a go because nobody knows.

One participant noticed that observing others' movement had been helpful outside of classes while walking:

I had one woman walking in front of me because the path was quite narrow. So she was walking ahead and I noticed that I was walking in the rhythm of her feet. [F3]

Theme 3: Participation in research

It was noted that participating in research could sometimes have a negative impact by highlighting impairments, but taking part in the pilot dance program provided a sense of achievement:

One of the things I noticed about taking part in research is when they test us for all things that they know you can't do . . .but actually I never came away thinking I can't. . .I've learnt a new skill.

I loved the fact that it was for me nothing to do with a drugs regime or an appointment regime or this is what you should be able to do. [F7]

Some participants expressed uncertainty about the research aims and would appreciate further information on this:

On the research side I would have liked to know more about what we're doing.

Theme 4: Strength and support provided by the group.

The importance of the group dynamics was highlighted, including a sense of support that came from being surrounded by people with similar goals and experiences:

. . .thinking about being collective, it kind of gave me the strength and the courage to be able to do it. . .everybody's just really putting their heart and soul into this, this is so nice. Everybody gave me encouragement. [F6]

The supportive nature of the group also provided an encouraging and safe space for participants to express themselves:

. . .it was very important that we all had Parkinson's and people didn't care, that was great in the sense of it didn't put anyone off. [M3]

Theme 5: Importance of the instructors and environment

Participants noted the support, sensitivity and encouragement provided by the instructors, appreciating the importance of their specialist experience and knowledge:

I think it's important that we do have the facilitators who actually are sensitive to our needs because if somebody comes in all gung-ho I think that would scare. . . [F6]

It was actually really clever how because they must have known beforehand that those are some of the things that people with Parkinson's find hard. [F3]

The venue for the dance classes (a theatre space in a community arts centre) enabled participants to immerse themselves in the creative experience without feeling self-conscious:

It was more inspiring as well wasn't it, you felt like you were performing rather than just in a room which was a bit cold, that was actually part of the creativity I think was to be in that space which was very helpful. [F7]

Theme 6: Physical, emotional, and psychological effects of participation

This theme reflected participants' enjoyment of the classes and the range of physical and non-physical benefits experienced. For example, some participants experienced an ease of movement while dancing:

I was just really amazed at how I could move. . . I kept going away thinking how come I can't walk properly but I can dance? [F6]

Participation was also associated with an increase in motivation and confidence to try other activities:

. . .we still can learn things and I think it's easier to give up and you don't give up. I was giving up. It's got me going again. [F6]

It's given me some confidence back. . . it's helped me just think do you know what I can have a go at that. [F7]

Focus Group

The following themes were generated from the focus group discussions: (1) The impact of creativity and imagery; (2) Using observation and imitation to support movement; (3) Participation in research; (4) Strength and support provided by the group; (5) Importance of the instructors and environment; and (6) Physical, emotional, and psychological effects of participation.

The themes are summarised in **Table 1** and reported fully in the **Supplementary Material**.

DISCUSSION

This study used the novel approach of co-developing and piloting a dance program for people with Parkinson's in collaboration with dance artists and individuals living with the condition. The perspectives of the different stakeholders ensured that (i) the program was informed by scientific knowledge, (ii) evidence-based elements were incorporated sensitively to preserve the creative experience, and (iii) the needs and preferences of people with Parkinson's were considered.

The dance program was found to be safe and enjoyable, and was well-attended apart from the impact of unrelated health issues. These findings indicate that a co-developed program is feasible. Additionally, participants reported experiencing physical and non-physical benefits of dance, and appreciated the support provided by the unique social context. The importance of the instructors' experience and approach, and the suitability of the environment, were also emphasised. These findings are consistent with previous qualitative studies of dance for Parkinson's (Houston and McGill, 2013; Bognar et al., 2017; Rocha et al., 2017), including the ENB Dance for Parkinson's program (Houston and McGill, 2013).

Analysis of the focus group also found that participants were aware of using motor simulation processes in the dance classes, supported by the creative environment and elements such as music, visual stimuli, and story-telling. Action observation, imitation, and imagery were noted to influence movement both within and outside of classes, suggesting the potential transfer of motor simulation to everyday activities and communicative actions. Recent survey evidence has associated the use of imagery within dance for Parkinson's with greater perceived benefits (Bek et al., 2021b), and preliminary findings from home-based observation and imagery training has also indicated the potential for people with Parkinson's to develop cognitive-motor skills that can be applied more generally (Bek et al., 2021a).

As noted above, motor simulation processes used in dance share similarities with techniques used effectively in neurorehabilitation (Blasing et al., 2012; Bek et al., 2020). Moreover, the use of music, themes, and story-telling may provide a particularly conducive atmosphere to promote imagery, potentially improving adherence and effectiveness in comparison to training that explicitly focuses on motor simulation. For example, music may enhance internal action representations by activating motor control areas of the brain (Zatorre et al., 2007). The use of visual stimuli (such as the images from the gallery in the present study) to promote imagery within dance could be further explored, for example by working with a visual artist and people with Parkinson's to select images that may evoke different movement qualities.

Similar to previous studies (Heiberger et al., 2011; McRae et al., 2018), participants valued that dance as a creative activity provided relief from thinking about their condition and focusing on their difficulties with movement. Despite some concerns during the development process about needing to concentrate initially on learning the movements before the more creative aspects of dance could be enjoyed, the focus group revealed that participants' enjoyment of the music and story-telling may

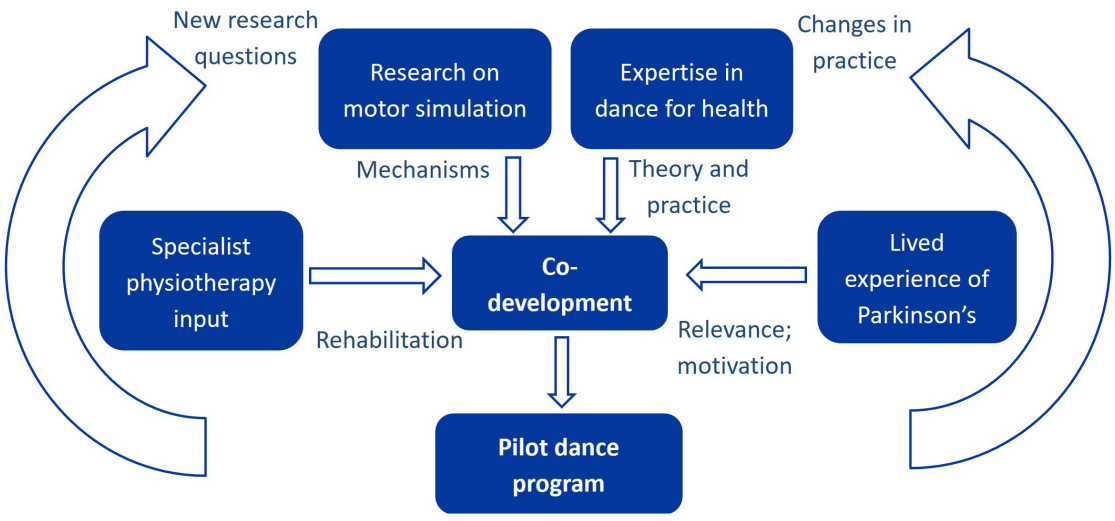

FIGURE 2 | Schematic indicating contributions of the different stakeholders to the co-development process, and the feedback of knowledge from the resulting dance program into both research and practice.

have allowed them to attend less to the physical challenges of the class. A recent small-scale study comparing immediate outcomes of dance for Parkinson's with an exercise class of similar intensity (Fontanesi and DeSouza, 2021) found greater physiological arousal after the dance class, as well as improved motor outcomes and self-efficacy, which the authors attributed to the aesthetic components unique to dance.

The exploratory outcome measures in the present study suggested potential improvements in quality of life, consistent with previous studies of dance for Parkinson's (see reviews, e.g., Bek et al., 2020; Carapellotti et al., 2020). The findings also indicated the potential for improving functional dexterity, which may relate to the incorporation of hand gestures in the program (see Duncan and Earhart, 2012, for additional evidence of improvements in hand movements following dance participation). Qualitative data from the focus group also revealed that participants used imagery of hand movements learned within classes to facilitate functional tasks. These findings are consistent with preliminary evidence from a recent home training study that used motor simulation to improve functional hand movements in people with Parkinson's (Bek et al., 2021a).

Data from the exploratory measures also suggested potential changes in action observation when watching dance, whereby larger saccades might have reflected increased prediction of the movements of the observed dancers (e.g., Diaz et al., 2013), but this should be examined in further research. Although there was no evidence of change in the vividness of participants' motor imagery, the questionnaire-based measure used in this study only tests imagery for basic isolated movements, and future studies should examine potential changes in imagery for movements that are trained within dance (e.g., Nordin and Cumming, 2006).

To increase understanding of the role of motor simulation processes within dance for Parkinson's, a larger trial should be conducted, using quantitative and qualitative methods to explore changes in motor imagery and action observation, as well as the transfer of motor simulation techniques trained through dance to everyday tasks. As dance intrinsically involves motor simulation (Blasing et al., 2012), the effects of incorporating specific exercises based on imagery and imitation could be examined in comparison to dance classes without these exercises, to determine whether outcomes can be enhanced. Alternatively, participants could be randomly allocated to receive supplementary motor simulation training alongside dance classes to optimise the implementation of these skills.

Finally, another novel aspect of the pilot program was the successful integration of influences from Ballet and Indian dance, providing complementary elements that are highly relevant to people with Parkinson's (e.g., postural control, hand movements, and expressive gestures), which was described by one participant as "a lovely fusion of dance styles." While influences of Ballet are already widely used within dance programs for people with Parkinson's, future research should further explore the use of culturally relevant styles such as Bharatanatyam, which could increase the appeal and accessibility of dance among underserved sections of the Parkinson's community (Kelly and Leventhal, 2021).

Conclusion

This study demonstrated the feasibility and value of a co-developed dance program for people with Parkinson's, informed by interdisciplinary expertise and lived experience. Dance for health programs can benefit from collaborative researcher-practitioner-participant partnerships (as illustrated in **Figure 2**), enabling evidence-based elements to be incorporated while preserving the creative and enjoyable aspects of dance. This would also empower users to have an active role in developing content and optimising the relevance to their goals. Future research should further examine the effects of motor simulation in dance for Parkinson's, by assessing outcomes relating to cognitive-motor processes and the transfer of motor simulation skills to everyday functional movement.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Manchester Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

JB: conceptualisation, methodology, investigation, data curation, formal analysis, writing – original draft, writing, review, editing, visualisation, and project administration. AA: conceptualisation, methodology, investigation, data curation, formal analysis, writing, review, and editing. FD-F: conceptualisation, methodology, writing, review, editing, and project administration. GG: conceptualisation, methodology, investigation, writing, review, editing, and project administration. MS: conceptualisation, methodology, investigation, data curation, writing, review, and editing. EP: conceptualisation, methodology, formal analysis, writing, review, editing, visualisation, and project administration. All authors contributed to the article and approved the submitted version.

FUNDING

This project was funded by an Economic and Social Research Council (ESRC) Impact Acceleration Account (ES/M500392/1) awarded to the University of Manchester.

ACKNOWLEDGMENTS

We thank the additional members of the project team: Helen Gould, Anne-Marie Booth, Colin Cheesman, Tessa Whiteside, Rachel Johnston, Laura Harvey, and Cheryl McChesney. We also thank all the participants in the pilot trial, as well as the Manchester Institute for Collaborative Research on Ageing (MICRA) for supporting preliminary work and dissemination, Z-arts community arts centre for hosting the project and providing a welcoming space for all, and Chris Currie for photography.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.731264/full#supplementary-material

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Conflict of Interest: GG is employed by Equilibrium International Limited. FD-F is employed by English National Ballet.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
published: 17 May 2022
doi: 10.3389/fpsyg.2022.732562

The Experiences of Parents and Infants Using a Home-Based Art Intervention Aimed at Improving Wellbeing and Connectedness in Their Relationship

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OPEN ACCESS

Edited by:
Stephen Clift,
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Reviewed by:
Kevin Moore,
Lincoln University, New Zealand
Theano Kokkinaki,
University of Crete, Greece

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *29 June 2021*
Accepted: *25 April 2022*
Published: *17 May 2022*

Citation:
Armstrong VG and Ross J (2022) The Experiences of Parents and Infants Using a Home-Based Art Intervention Aimed at Improving Wellbeing and Connectedness in Their Relationship. Front. Psychol. 13:732562. doi: 10.3389/fpsyg.2022.732562

During the period of COVID-19 restrictions, we offered vulnerable families with 0 to 3 year old children boxes of art resources and guided creative activities to do together at home. This paper explores families' experiences of this intervention, highlighting their perceptions of change in wellbeing and attachment. There is a developing case for the social benefits of art, including the impact of arts on mental health and on the wellbeing of children. However, we know that social factors impact upon arts participation, and existing inequalities and mental health difficulties have been exacerbated in the context of the pandemic. This project aimed to adapt to restrictions, to provide a meaningful remote intervention, supporting parent-infant dyads to have positive interactions through art making. We sought to explore the benefits of this intervention for infants and parents with a view to understanding more about the psychological benefits of art participation and about ways to engage families into art making, as well as thinking about how best we can evidence these kinds of arts in health interventions. Preliminary findings showed promising outcomes from the art boxes and this paper brings together the full results, primarily based on interviews with sixteen parents and four referrers alongside collected feedback. We highlight potential mechanisms for change within the intervention and detail the perceived impact of the art boxes in supporting attachment. Parents felt that the art-boxes facilitated changes in their own wellbeing that would make them more available to connection, and recognised changes for babies that reflected their increased capacity to mentalise about their child. Importantly, there were also concrete changes for the dyad that represented improved connection, such as more playful time together and increased shared attention and eye contact. Our observations suggest that the quality of the parent-infant relationship benefited from home-based art intervention, and we speculate about the potential efficacy of this approach beyond the pandemic.

Keywords: art, attachment, connection, wellbeing, dyads, parent, infant

INTRODUCTION

Art at the Start is a research project embedded within a public arts venue, aiming to explore the benefits of early art making for families with 0 to 3 year old children. We approach this aim from various angles, including art therapy sessions for parents and infants at risk of attachment difficulties, and public sessions seeking to increase families' use of art with very young children. During the COVID-19 restrictions, we maintained contact with the families referred to us for attachment difficulties. We achieved this by providing 'art boxes', containing materials and activity guides for families to make art together at home. The current paper explores the benefits of this home-based art intervention for infants and parents, with a view to understanding more about the psychological benefits of art participation, about ways to engage families into art making, and how best we can evidence arts in health interventions.

The Psychological Benefits of Arts Based Interventions and Their Social Context

There is increased awareness of the social benefits of art participation (Fancourt and Finn, 2019), including the impact of arts on mental health (Davies et al., 2016; Jensen and Bonde, 2018) and on the wellbeing of children (Bungay and Vella-Burrows, 2013; Mak and Fancourt, 2019). Art venues therefore have an important role to play in wellbeing for individuals, families and communities (Crossick and Kaszynska, 2016). However, social factors, such as socio-economic status, deprivations, disabilities, existing health conditions, ethnicity and family background, impact upon arts participation (Matthews et al., 2016; Fancourt and Steptoe, 2019; Mak et al., 2020). As a result, arts venues must rise to the challenge to facilitate engagement for all communities (Silverman, 2010).

In our locality (Dundee, Scotland) families can face multiple disadvantages, with more than a third of areas among the most deprived in the country (SIMD, 2020). Difficulties impacting upon children include a higher percentage of first-time mothers under age 19 than the national average, and more parents living with long-term physical or mental health issues. An estimated 30.1% of children live in households that experience both low income and material deprivation (Dundee City Council, 2019). The pandemic can be seen to have aggravated existing inequalities (Blundell et al., 2020), including the early experiences of children (Papworth et al., 2021b). Research has found a significant impact on children's rights from the COVID-19 measures, including poverty, food insecurity and equality of digital access (Treaner, 2020). A 2020 report into digital exclusion in Scotland gave an estimate of 800,000 people facing digital inequalities, a main driver of which was poverty (Halliday, 2020). This is particularly crucial for the arts sector given that many galleries and museums tried to remain connected to their audiences in 2020 by creating online content, such as children's art ideas. This means digital exclusion may have exaggerated existing inequalities in children's and families' access to the arts at this time. Preconceptions about the need for art resources and materials in the home may also have put families off from accessing online content related to art making. In addition to physical resources, the use of online arts content requires less tangible resources within the family unit; significantly, an adult carer needs to have capacity (both in terms of time and mental wellbeing) to make such activities available for children in the home.

An estimated 10–20% of mothers develop mental health difficulties during pregnancy and in the year after birth (Bauer et al., 2014). Post-natal depression is perhaps the most researched and recognised mental health difficulty affecting new mothers, with universal screening in place in the United Kingdom (Field, 2017). However, there are clear barriers to accessing support (Goodman, 2009). There is also growing research into the high prevalence and under-recognition of post-partum anxiety (Zappas et al., 2020) and the risk of post-traumatic stress disorder (Harrison et al., 2021). Evidence of similar mental health difficulties for new fathers, and the impact of this on their children, is also growing (Paulson and Bazemore, 2010; Kahn, 2017). The impact of the pandemic in exacerbating parental mental health difficulties has been demonstrated with prompt research showing increased rates of post-natal depression (Wu et al., 2020) and increased depression and anxiety in mothers of younger children and pregnant women (Cameron et al., 2020; Lebel et al., 2020). In particular, Gassman-Pines et al. (2020) found the impact was greater for those who were already vulnerable. A review of maternal mental health during the pandemic (Papworth et al., 2021a) found an increased risk of mental health difficulties, including stress and anxiety caused by giving birth over this period and concerns about their infants. They also found that services for perinatal mental health were stretched pre-pandemic and increasingly inadequate during the pandemic. At the same time voluntary sector, community and informal support was greatly reduced. Importantly, the quality of early attachment relationships is known to be impacted where a parent has poor mental health (Cummings and Cicchetti, 1990) with both depression and anxiety associated with impaired parent-infant bonding (Moehler et al., 2006; Davies et al., 2021).

Parent-infant relationships are likely to have similarly been impacted by the pandemic. A report into the experiences of 0–2 s during the pandemic (Reed and Parish, 2021), though highlighting that there may have been some benefits through increased time with both parents in the home, is clear that there are risk factors in the reduction of direct services. They also identify potential harms from lack of social interactions, exposure to trauma, material deprivation and the increased stress upon parents resulting in less responsive parenting. A report from a survey of the parents of babies during the pandemic (Saunders and Hogg, 2020) found that a quarter were concerned about their relationship to their baby and a third felt that their interactions had changed. The attachment relationship with their primary caregivers, and the responsiveness of care which they receive within that, will be crucial for infants' emotional wellbeing (Benoit, 2004). From an experience of responsive care, infants develop their own sense of self and develop social and emotional skills such as the capacity to regulate or to relate to others (Schore, 2001; Landry et al.,

2006; Barlow et al., 2010). Secure attachments will support their development and wellbeing throughout childhood (Sroufe, 1996; Warren et al., 1997; Belsky, 2001) whilst insecurity results in a heightened risk of later social problems and behavioural difficulties (Belsky and Fearon, 2002). Concerningly, studies found that, even before the pandemic, between a third and a half of children were insecurely attached (van IJzendoorn et al., 1999).

Fortunately, early attachments are open to change (van IJzendoorn et al., 1995) Interventions that focus on the dyads relationship and their interactions have been shown to be beneficial to attachments (Cohen et al., 2002; Baradon, 2005). Within the context of dyadic art therapy sessions, research studies have shown improvements in parental wellbeing, mental health and attachment relationships (Arroyo and Fowler, 2013; Armstrong and Howatson, 2015; Armstrong et al., 2019; Lavey-Khan and Reddick, 2020; Bruce and Hackett, 2021). A review of art therapy with this client group found that the capacity to bring dyads together into positive interactions was central (Armstrong and Ross, 2020). Benefits from shared art making in the early years has also been demonstrated in a participative art context (Starcatchers, 2014; Black et al., 2015). Art making inherently allows for intersubjective communication (Dissanayake, 2000; Gerber et al., 2018) so may be particularly suitable to support attachment. Where both parent and infant are active participants in art making, it may help to draw them together in a playful way. This has potential to benefit the wellbeing of both parent and child and can facilitate moments of the kinds of sensitive, connected experiences, which build secure attachment relationships (Meins et al., 2001; Bigelow et al., 2010).

The Current Study

In March 2020, due to the COVID-19 public health measures and restrictions, all our face-to-face art therapy work was put on hold. We were concerned about the withdrawal of support for vulnerable families, and their relative lack of resources to participate in some of the online activities offered by ourselves and others over this time. To address this concern, we piloted an innovative method to promote the families' engagement in joint art making by providing boxes of art materials and guided activities to do together at home. The intention was to support psychological wellbeing and encourage positive playful interaction during the pandemic restrictions. However, given the potential of the art boxes to reduce inequalities in access to the arts, we also wished to explore whether this would be a useful intervention for engaging vulnerable families beyond the pandemic. The research sits within a pragmatic paradigm as a piece of action research; seeking to create change through the research process (Greenwood and Levin, 2007) and drawing on the methodologies which best address research questions as opposed to fitting into a particular world view (Kelly and Cordeiro, 2020). This feels a good fit within Arts in Health research, where we may often be bringing together quite diverse perspectives from the humanities and medical sciences, focusing enquiry on actionable knowledge. By using rich qualitative analysis of how families experienced the pandemic, and the intervention, we aimed to gain insight into whether families perceived the art boxes to be helpful, and why. The voice of the family is important, and our approach informs debate about how best we can evidence arts in health interventions in a meaningful way. Our overarching research questions were:

1. What challenges for connection did our families (referred for attachment difficulties and/or mental health problems) face during the COVID-19 restrictions?
2. How did the 'home art box' intervention affect these experiences? Did parents perceive change in their own and/or their infant's behaviours?
3. If 'art boxes' are perceived to create change, what might the mechanisms of this change be?

MATERIALS AND METHODS

Participants

The art boxes were a rapid adaptation when planned supports for families were put on hold. This intervention and research had ethics approval from the University of Dundee research ethics committee (SRECPhD-033). Initially art boxes went to 40 families who had been due to commence art therapy sessions with the project but that were cancelled due to COVID-19. These families had consented to being referred for art therapy by health visitors, family nurses and voluntary services due to concerns about their attachment relationships. We reached out to all families whose sessions had been cancelled to offer them a box when it became clear the delay to sessions was going to be long term. All families who were offered a box chose to receive it. As pandemic restrictions continued, this initiative was subsequently expanded to take referrals from health visitors, family nurses (working with young parents) and three charity partners (working with ethnic minority families and families facing deprivations). Again, families provided consent for referral. Referral criteria were for parents and their infant (aged between 0 and 3 years) where there were concerns about the attachment relationship and referrers thought they would benefit from play in the home. Referral was based on the concerns of the referrers and we accepted every referral that met our inclusion criteria without screening or taking any baseline measures. This was due to the projects desire to quickly support families in the face of restrictions.

In total, we delivered 154 boxes to families during this stage of the project throughout the summer of 2020. **Figure 1** shows the distribution of referrals among the different routes. Where we held address information for participants (some boxes were distributed directly by the charity partner) we were able to look at the SIMD index (SIMD, 2020). This showed that 57% of the families were in the first or second decile, that is in the most deprived 20% of the population (**Figure 2**). This suggests that the art boxes may be useful in reaching families facing inequalities. However, there were also referrals within areas of least deprivation, reflecting the pervasive risk of perinatal mental health difficulties, regardless of social context. Only one referral was for a father and the rest were all mothers (although the thematic analysis highlighted that some fathers did become involved with the art making at home).

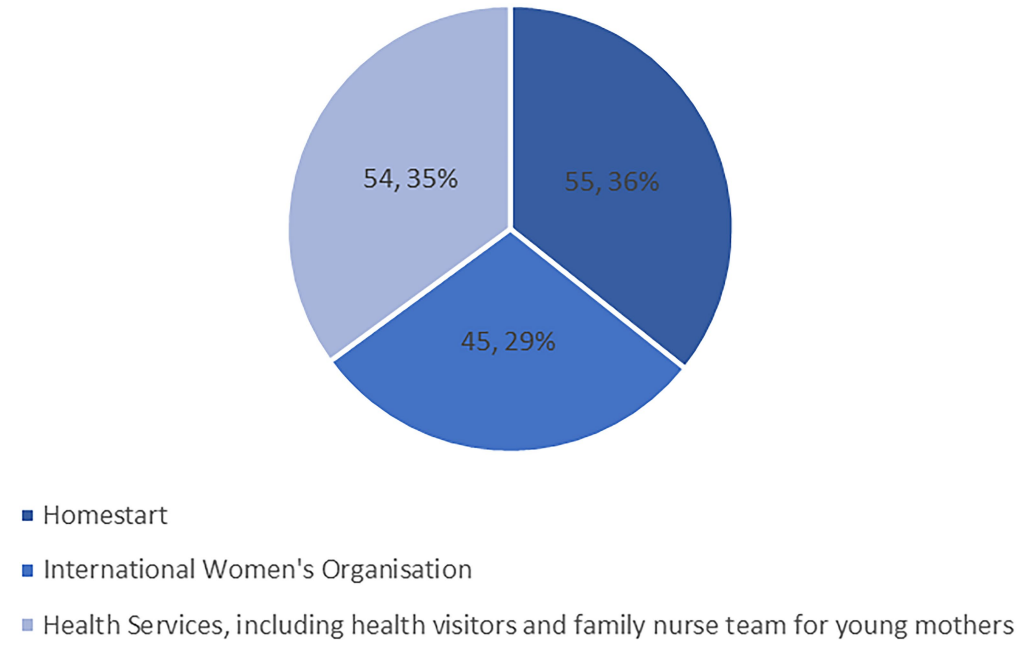


FIGURE 1 | Distribution of Art Box referrals (giving number of referrals from each route and percentage of total).

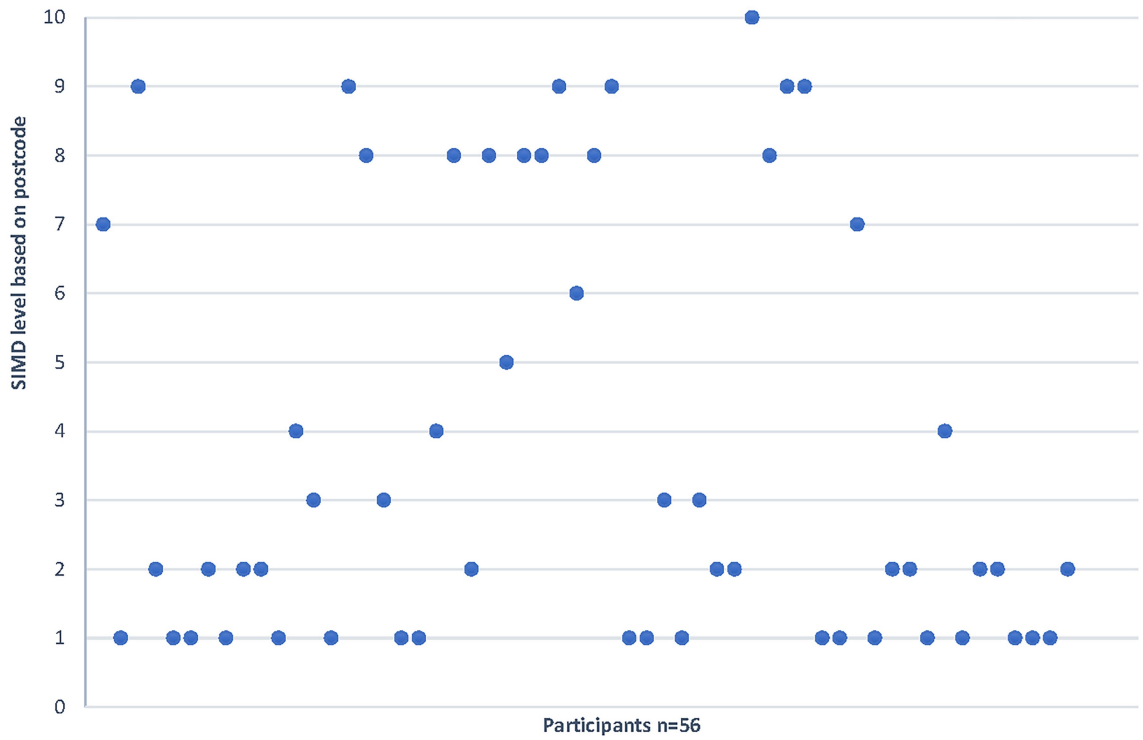


FIGURE 2 | Scottish Index of Multiple Deprivations (SIMD) level for participant referrals (where 1 is the most deprived decile, and 10 the least deprived decile).

Intervention

The art boxes were designed by the team's art therapist with the aim of encouraging parents to make art together with their infants, fostering connection through playful and creative shared experiences. Although the art boxes are not themselves art therapy, as they are completed outside of any therapeutic relationship, they took inspiration from our research into the benefits of joint art making during art therapy sessions.

There were a broad range of baby-safe resources (**Figure 3**), including paints, brushes, stamps, clay and papers. Alongside was a booklet with information of why art making together is beneficial from a psychological perspective, that could be considered psychoeducation, guidance on the practicalities of getting started with very young children, such as ways to set up the space, and then 12 guided activities with lots of flexibility for age and stage (**Figure 4**). These were documented with photographs as well as written instructions in case literacy was an issue. All activities focused on doing the art together. Although not in person, we still consider the art boxes to be an intervention as they were supporting families where a need had been identified and sought to create change, by encouraging participation and guiding them through the art activities. There were clear instructions and well as direction on ways to engage. For example, parents were encouraged to follow their infant's lead and respond, or to verbally describe what infants were choosing. The box also contained a written participant information leaflet explaining the opportunity to take part in the wider research project and giving the researchers contact details.

Data Collection

Our data collection included a variety of different methods. For reporting to our wider organisations and funders we had included anonymous postcard feedback, with a simple survey and space for open feedback (and a tick box for consent for the feedback to be used for research), in every box. These results are included in **Supplementary Material** and, although positive, are limited in number ($N = 57$), and by the fixed scope of questioning. The main data gathering for this research is based upon in-depth interviews with a subset of participants and referrers, alongside gathering informal feedback to include wider perspectives. Interviewees were recruited during referral, where parents were asked to tick a box if they were willing to be followed up for interview after they had used the boxes. This aimed to minimise responses being biased by whether parents felt positively about the art boxes, although they would still have been able to opt out of being interviewed by not responding to our calls. We are also aware that those agreeing to interview, even in advance, may also be those more inclined to be favourable to the intervention. Given the specific population focus of our topic we estimated that between 15 and 20 interviews would give sufficient breadth of subjects and this was confirmed by the richness of the data (Braun and Clarke, 2021, p. 34). Twenty parents agreed to interview on their referral form and we interviewed 16 parents, based on those who we were first able to contact by phone. The interviewees were all mothers with infants between ages 0 and 3. There was an even spread of participants among the referral organisations, meaning that there was likely to be a balance between families facing isolation, families facing difficult social circumstances and families where there were mental health or attachment difficulties. However, our consent process was based on interviews being anonymised and not linked to referral information, as our small geographical area would risk interviewees being identifiable, so we are not able to compare the interviews with demographic data. In terms of previous experience, 14 of the parents had never tried making art with their baby before, and two had tried to a limited extent or with older children. When asked if they had visited the arts venue in which Art at the Start is based (Dundee Contemporary Arts) with their baby, none of the parents had, although one had been previously with older children and two had been for social visits to the café bar.

FIGURE 3 | Contents of an Art Box.

Activity 7.

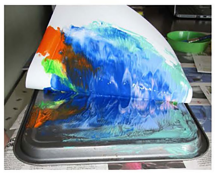
Printing with baking trays and muffin tins

This is a fun way to bring something different to painting with little ones. Doing a contact print from paint on a surface rather than straight on to the paper gives a different effect to the finished painting and you can do several from one surface to get a set. Wee ones seem to like the chance to paint on something normally out of bounds and the smooth surface lets them push about the paint in a different way to when it's on paper. We particularly like the mini paintings from the cupcake tin as they are easy to handle when you're small and look cute all together or stuck onto cards to send to relatives.

You need:

- Covered floor or table
- Metal baking trays
- Cupcake or muffin tins
- Paint
- Brushes or hands for spreading
- Paper– big bits and some cut into squares (you could also use cereal box card if you're out of paper)

Let little ones pour or brush paint onto the underside of a baking tray or the paint tray. For babies you might want to put the drips of paint straight onto the tray yourself and let them feel it and smear it about.



When they are happy with their design, help them to lay on a sheet of paper and gently rub the back before peeling off to reveal the print.

You should be able to print several before the paint runs out or they can add some new drips and try again.

For the little cupcake prints we cut our paper into small squares and then did the same thing. Spreading colours over the underside of the cupcake tins and then printing each one. This would also be a good chance for toddlers to practice mixing different colours and seeing what happened as each little circle is a different experiment.

These look lovely put up as a collection or you could use them for collage. We decided to make ours into a caterpillar by cutting out each circle and joining them all together.

FIGURE 4 | Sample pages of Art Box worksheets.

A further level of feedback data was based on interviews with referrers from across the range of roles in our referring partners. We reasoned that it was important to hear both directly from parents and from informed observers of their relationship, to best capture any change in parent-infant engagement. Including referrers helps give an indication of whether the feedback we got from our interviewees was reflective of the wider group experience. Referrers had knowledge of the general picture for the families they work with and had seen the boxes used by a number of their clients. We interviewed four referrers—an NHS health visitor, an early years support worker, a community group support worker and a family nurse. The referrers interviewed also stated that the families whom they had referred had not made art together before. This brings the total number of interviewees to $N = 20$.

A semi-structured interview method was chosen—with an interview guide of potential topic areas (see **Supplementary Material** for the interview topic guide) but no set interview schedule. This allowed the researcher flexibility to respond, follow up or expand on comments (Rubin and Rubin, 1995) and to clarify questions or answers (particularly important as English was not the first language of all interviewees). For all participants, the interview began by discussing the information provided in the participant information leaflet, giving the opportunity to ask questions, and obtaining a recording of verbal consent.

Alongside the transcripts of the interviews, we have included informal feedback from both parents and referrers, gathered throughout the project in the form of emails, text messages and social media messages (43 records). The participant information leaflet in our boxes gave our contact details and information on how any feedback (formal or informal) would be used. Where feedback was passed on by referrers, we made sure to clarify that parents were happy for it to be included in the research. Parents also shared photographs with us through email and on social media. Researchers have successfully used images in social research, for example by producing and analysing text-based descriptions of participants drawings (Savoie-Zajc, 2005) or by having participants take photos that form a basis for discussion (Radley et al., 2005). Images may be used to develop a shared communication between researcher and participant (Harper, 2002) and there is increasing interest in using visual methods to allow participants to communicate their perspective (Gauntlett and Holzwarth, 2006). In our case these images were 'naturally occurring' rather than elicited, but as these images had been chosen by parents to share, it was our understanding that they would therefor reflect something of importance to parents about taking part in the project. With the parents' consent, these images (112 records) were included in the analysis alongside the text data.

Qualitative analysis was undertaken using Nvivo software (version 12, 2018) which allowed us to include the images

alongside the transcripts and screenshots of informal feedback. We used thematic analysis to reach a meaningful understanding of the data within this rich data set and took a reflexive approach as outlined by Braun and Clarke (2006). We took an inductive orientation to the coding, starting from the data, but with awareness of our own theoretical understanding of interactions within early relationships. We coded for both manifest meanings (what the parents were directly telling us) and latent meanings (in our case where examples of behaviour they described seemed to evidence psychological change in parent or child as defined by our theoretical underpinning; Braun and Clarke, 2022). A preliminary analysis of 10 parent interviews (Armstrong and Ross, 2021) had identified initial themes so we had these in mind, but we coded the entirety of data again and introduced new codes as needed. The full data set was coded by the first author and then these codes were reviewed by the second author before they were refined further. Following this, codes were organised into themes that made meaningful sense of the entirety of data. These will be discussed in detail here and examples given.

RESULTS OF THEMATIC ANALYSIS

The themes we have developed from coding of interview transcripts, informal feedback and images are wide ranging. They reflect the depth with which the participants shared their experiences as parents (including of their time over lockdown), how they had used the boxes, and how they felt about the art-making process. We have found it useful to organise the themes into groupings under three larger overarching areas that look at the **challenges for parent-infant connections (1)** both during parenting generally and in lockdown specifically, the **mechanisms of change with the art box (2)** intervention, including practical and psychological aspects, and lastly the **resulting impact on connection (3)** as reflected in the changes seen for parents, infants and the dyad. This structure allows us to make meaningful sense of the entirety of the data while keeping the parent-infant relationship as a central focus and offering clarity about what specific mechanisms within the art making may help to create change for dyads. **Figure 5** outlines this structuring of themes and subthemes. These are described more fully below with a selection of quotes that are representative of the larger body of data (**Figure 5**; For ease of reference, as specific themes and subthemes are mentioned in the text they are given in bold as THEME, and **subtheme**).

Challenges for Parent–Infant Connection

This category gathers together themes reflecting difficulties in the families' lives that we would recognise as having a large impact upon the parent-infant relationship. This gives us a picture of some of the areas of need which we hoped to address with the art boxes. Parents and referrers talked about POOR WELLBEING AND MENTAL HEALTH that was already an issue outside of the pandemic.

> *She had really low mood and anxiety - was anxious before covid (referrer).*

We know that these mental health difficulties can limit a parent's availability to form connections with their infant. An important subtheme emerging from this area was parents' perception that there was a **lack of support** in their area.

> *I don't even know if there would have been anything that I could have gone to anyway. Like I don't ever think there's very much around for mums. Like not much stuff to help them (parent).*

An important theme coming from both parents and referrers was that LOW WELLBEING INCREASED OVER THE PANDEMIC.

> *I think we've seen Covid has had huge impacts on our clients. I would say increased levels of anxiety, isolation, loneliness. And you know, anybody with diagnosed mental health issues have deteriorated (referrer).*

One referrer also brought up the potential for increased stresses for the infants over this period and gave examples of infants now facing heightened separation anxiety or lacking in socialisation.

Subthemes here added detail to some specific issues for parental wellbeing. Parents described **loneliness and isolation**, and particularly those alone at home with an infant, found it extremely challenging during lockdown not to have other people with young children to interact with.

> *It's been like completely shit. Like we're on our own just. There's nobody here but me with the baby. I hadn't really met anybody before it started, so to actually have someone, like to meet or that with kids… So there's not any really friends to see or anything so. It's like just not really been good (parent).*

For some parents this then also led to them feeling guilt for feeling lonely:

> *it was like so lonely. I feel guilty because I'm not on my own, I'm with her, but, Yeah, just like long, long days. It's a bit long with a baby anyway, but long and yeah, just feeling by myself, You know? (parent).*

One factor which may have contributed to this isolation was a sense of feeling different from their peer group when they were the only one with a baby. This may have been particularly relevant to the younger mothers in our sample. This added to a feeling that their experience of lockdown was very different from others.

> *I'm the only one of my friends with a baby, and then I speak to them and it's like they have absolutely no idea how it would be like for us to be by ourselves. They're like not even finding it that bad and they're like happy, maybe, that they're not, not having to go into the office. But then for me I'm like just us at home all of the time. It's like they can't even imagine that (parent).*

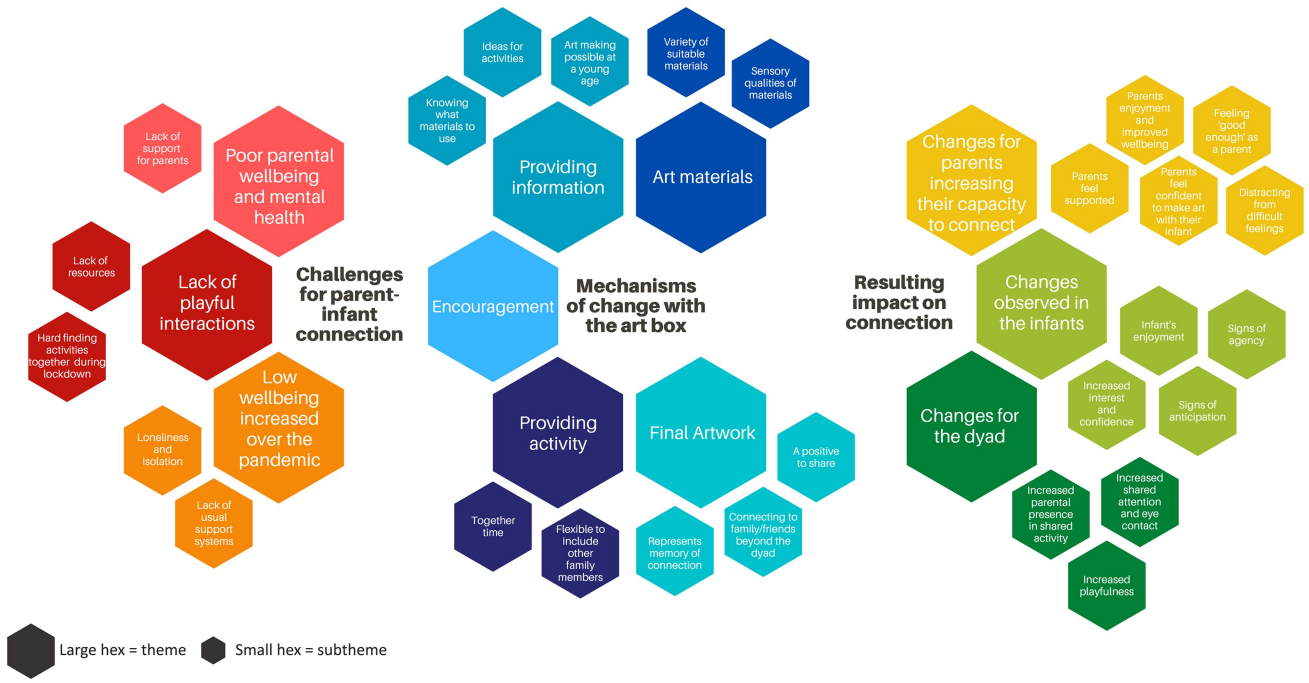


FIGURE 5 | Diagram describing organisation of themes from thematic analysis.

Adding to the experience of decreased wellbeing was the parents' **lack of usual support systems**. The referrers described their own reduced capacity to support families over this time, particularly the lack of face-to-face meetings. But on top of reductions to services, families also experienced a loss of informal supports from family, friends and other parents. For some parents the lack of support which they perceived was a source of anger.

> *No, nobodys did anything. I think it's terrible that so many of the things that should be on for kids have just been totally stopped. You know, it's like, as if they just don't think about how things are for us, nobody's thinking about kids, about…you know (parent).*

The last theme identified as a difficulty for connection was a LACK OF PLAYFUL INTERACTIONS. Some of the referrers expressed concerns about witnessing a lack of interaction and play in houses, and their difficulties in getting families to engage with suggestions. They described issues with televisions being on in the background and limiting interaction, or parents not knowing how to play.

> *I came in this job thinking everybody knows how to play with their children but they don't. And that is probably one of the biggest things that we all need to be supporting the families with (referrer).*

Parents focused more on the specific difficulties of play during lockdown, which was possibly easier for them to talk about, but some did express finding it hard to play more generally and linked this with mental health difficulties.

> *if you're not feeling good, it's like, actually too much to try and think of something yourself to do (parent).*

The lockdown specific difficulties for play included parents' observations that it was **hard finding activities together during lockdown**. They described long days, feeling bored, and struggling to keep themselves and their baby occupied.

> *like you're on your own, I guess, at home and it's just really us so that it's hard to think of what stuff we might do together. It feels quite long, I guess. A day like. The days are going, yeah, go really slowly and you don't do, like you're playing with their toys and you're trying to do something fun for them. But actually, if you're not really able to go out and join in with stuff or meet your friends like there's just not that much, you know* (parent).

Parents with older children in the house highlighted the added difficulty of finding something to play with different ages at the same time and the need to divide their attention. The lack of parenting groups that might normally be on, such as library groups doing stories and rhymes or parenting groups, came up in most of the feedback. Some had tried virtual alternatives but not found these to be less useful.

> *that's one of the main problems, I think, was that all the stuff that would normally be on for babies, all of that just stopped.*

And I know like it's nobody's fault. And then sometime some were, were trying to do stuff, like over the computer with like Skype and stuff, but, I don't really want to be doing computer stuff. I went a couple of times to, em, like a mum and baby group that we were thinking about before, and joined in with their, I think it was on like a Facebook thing, not on Skype… so I tried that, but it's just, It's no… I mean, there's no point in it for [baby]. And then just on a screen, just looking at other mums, you know (parent).

A **lack of resources** was also an issue, with parents describing material issues getting in the way of play with their infants. There was limited availability of toys or art materials in the house, sometimes due to not knowing what resources would be suitable or having limited access to shops during lockdown, but mainly due to their financial difficulties. A high proportion of the families were on low incomes and financial difficulties may have increased over the pandemic with some reporting partners losing work. A resource issue existed around physical space leaving families feeling restricted in how much they are able to play in their homes, particularly for those with more than one child. Another issue was around internet access, with one referrer giving an example of families having internet cut off due to their financial circumstances. This would result in difficulty for families in accessing some of the ideas and help for play that were put online.

our house is small, so there there's not that much space for us to have room in the house and then… We have toys, but not so many. And hard for them to share those (parent).

Mechanisms of Change With the Art Box

Within this category we have organised all the themes where parents and referrers described specific qualities of the Art Box intervention which we would consider to be mechanisms of change. These help us to think about what the process of using the box does and why. An important theme here, brought up by all participants, was ENCOURAGEMENT. Parents described how it gave them a push to try something that they might not have otherwise, or an extra bit of motivation. Some described trying it because they felt they ought to and then being surprised when they enjoyed it. There was something useful about having everything they would need ready to go and a specific thing to try for overcoming barriers to having the first attempt.

I always felt that I want to be doing things, but just finding that I didn't really have like the energy or I wasn't really enthusiastic to do them. So sometimes you just have to start the thing. And then it will be good. And so having that idea and this nice box of stuff, that, that gave me that (parent).

Every participant described how they had tried various activities within the box and referrers also described families giving it a try where they may not have expected it.

And some of the families that I thought they would not use it, they did! "Oh yeah, we have used it, we have done finger painting" and they were enthusiastic about it. They were quite impressed with it. So it was all really good feedback actually from the families (referrer).

One referrer was able to give very specific examples of a couple of families where she could clearly see the resource had been used. One mum had surprised her by getting out all the materials to do footprints and the baby obviously having experienced it before as they were joining in and painting their own feet. She observed another toddler making shapes using the crayons and felt she looked familiar with the activity, indicating the family had been engaged with art making for some time. This sense of encouragement to try the art making is also reflected in the images which we were sent back where a large number of these we classified as showing the infants trying the art materials (e.g. **Figure 6**). This perhaps reflected parents desire to share that they had tried the art box.

The art boxes were PROVIDING ACTIVITY and parents described their appreciation at having things to do in their day together and some activity that was planned for them—*something to keep us busy and make us feel better*. This theme connected to some of their frustrations over lockdown with boredom and lack of activity.

I know it's been really nice because, I don't know, just having a focus, like a thing that we're both meant to be doing, gives you that something busy in your day. Um. Gives us like, I guess time we're not watching telly we're just like, doing something and I think there's not been enough stuff in our day that we've been doing (parent).

Parents appreciated that it was possible for the activity to be **flexible to include other family members**. Parents told us about involving the other parent, their own parents or taking the boxes to friend's houses when restrictions allowed this.

These boxes are not just art boxes, these are boxes that bring families together, because me and my husband have been doing these activities with the children, and guess what Gran joins in too (referrer).

In particular, parents spoke of being able to include older siblings in the activity too and described how managing different ages had been a challenge, so this was a useful quality.

I think it was nice. It was like easier to do this with them both than I think it is to do other stuff…maybe because it was new things for both of them. Actually, they got along a bit better doing it and it was easier for me (parent).

Several parents described less antagonism between siblings while doing the art together. This theme also included images sent in my parents of siblings making art works together (example **Figure 7**).

FIGURE 6 | Image shared by parent of infant trying art making (image cropped).

FIGURE 7 | Siblings using the art box together (pixelated).

A subtheme about having activity to do together was that this was an activity about **together time**. Parents described how these activities were ones which they were meant to be doing together with their child and that this was something both different from normal and which they valued.

> *I think the art it did make a difference, but it's like a thing that, like I can't think how to say it. Like it, ah, like it brings you into something so you both are doing? Or something that, like the point of it is to do it together, you know? (parent).*

This was also reflected in comments from referrers who had noticed that families considered the art making time to be special time for the two of them.

> *It's been interesting actually one of the parents I spoke to just this week said in one of her observations, she was like 'it's really quiet when we're doing it'. And I said Oh what do you mean, like they're not talking. And she said 'no because normally I'd have that tele on but for this I turned it off (referrer).*

This sense was also captured in some images returned which showed the mother and infant together during or after art making (e.g. **Figure 8**). Both parents and referrers spoke about parents setting aside specific time in which they would do the activity together. This showed the value placed on this together time, and also that it helped them to have some structure within lockdown.

> *she really recognised herself that she was missing routine. So she had the two days, so she would spend the morning with him doing arts and crafts and things, then and then afterwards they had good fun to put him in the bath to get clean again. So yes, she really found it beneficial (referrer).*

The third theme relating to mechanisms of the art box intervention is the physical provision of the ART MATERIALS and the different qualities they have. Many parents and referrers appreciated being provided with the resources which they may not have been able to afford or find otherwise. Some parents commented that they liked having the materials chosen for

FIGURE 8 | Image shared of parent and infant doing activity together (image cropped and pixelated).

FIGURE 9 | The art materials laid out (cropped).

them and particularly that there was everything they needed for the suggested activities, so they did not have to add anything in themselves. Others commented that there was plenty provided, so they had been able to keep using them after finishing the suggested activities. They described the different materials that they and their infants had particularly liked and gave examples where the physical qualities of the materials were particularly suitable for babies.

> *She seemed to really like the big crayons that you can, she can hold in their hands now it's nice and like she could just hold it (parent).*

This appreciation of the materials was visible within the images, where we got a high number sent in which showed the different materials (e.g. **Figure 9**). These kinds of images were unexpected to us but may illustrate the importance of the materials to the families.

Many parents brought up was about **variety of materials** and enjoying the mixture that was on offer.

> *With toys it's a bit repetitive…it's always the same games that they choose right? With the art stuff it can change so much to different, you know, we could be doing hand prints or we could be doing clay or we could be drawing a house, or whatever, so you know, it changes so much, and oh the feathers, you know, we had so much fun (parent).*

One parent described how some of the materials like feathers their baby was able to explore now but would be able to use more when they were older so the box would adapt with them. When describing favourites, it was interesting that several parents observed that their babies and their own preferences were different but that this was a positive thing.

> *I mean any of the ones that were covered in, like slimy paint for him, I think. But for me, probably the ones that gave me something nice to keep. So probably our favourites were like the opposite and that he liked something messy and I liked something like the clay handprints. That I will like, always keep those. But I think, probably that's quite a good balance, isn't it? That there was things for both of us in there? (parent).*

This idea of being able to meet a variety of needs through provision of materials with different qualities was also reflected by parents with siblings of different ages.

> *I think he, it's hard to tell with the baby what was their favourite, but I think just like maybe more the feel of everything rather than the, like rather than the actual particular activities. Like the colours and the feeling you know. Whereas for my older one he'd see the idea of what you'd made and try to copy it (parent).*

Parents commented on the **sensory qualities of materials** and noticing that their infants were liking their tactile nature.

> *I think she just liked painting and the chance to get your hands in and like, she liked the feeling of it, and I notice by the end more confident to like, to put it onto the paper and be like moving it about with their hands. I think she just really like that feeling (parent).*

Within this theme, mess was something that came up a lot and was also reflected in the number of images we received showing the messy materials or babies covered in paint (see **Figure 10**).

Some parents commented about some initial nervousness about the mess while others spoke about the mess very positively

as being fun, or expressed pride that they had been willing to try it.

> *I think like one thing I've notice that's different is I'm kind of prepared to get quite messy, so I'll put on clothes I really don't mind getting covered in paint and so actually, even when she's like covered in paint or something, I don't mind if she wants to come and cuddle me (parent).*

Parents described ways the art box had helped by PROVIDING INFORMATION. Within this were comments about getting practical knowledge as well as art ideas and for some parents more understanding about how to be with infants when making art together.

> *the idea was there because, you talked a lot about it being, about the, like, about the doing it, so I felt a bit more relaxed (parent).*

Parents all said that having the **ideas for activities** contained in the booklet had been important for them, some saying they had been a bit nervous, or would not have been able to give it a go without these ideas and others just how it had helped them by giving them new ideas. Several parents described that it helped to have an ideas for a starting point even if they then took the activity in a different direction.

> *I think it helped having just ideas 'cause it's hard sometimes to just think of 'What would the baby do?' like 'How would your baby do this?' I think if I picture making art with kids and I'm thinking of like drawing wee stick people or something and actually, that's not what the babies are doing. So it was good to see those ideas of things which were more about the messy like fun side of it rather than drawing. I liked things I wouldn't have thought to do like the one where you were on like the cupcake cases underneath and printing on and then like doing it onto the bubbles, so I guess it's all kind of just paint but using something just to make it a bit different each time. It was nice having those ideas (parent).*

FIGURE 10 | An image of messy paint exploration.

As well as ideas for specific activities, parents talked about getting information for **knowing what materials to use** with infants. Not knowing what would be suitable was something that had prevented some of them from trying art and several expressed being reassured by the information about what to use and how to use them safely.

> *giving me all of the stuff so that I definitely knew that those ideas were safe and that like they would work and everything. And it told you how to set up and stuff (parent).*

Another way the boxes gave information was by letting parents know that **art making is possible at a young age.** Parents described how they had not thought they were able to do art with a baby and that getting the art box had let them know that this was possible.

> *When they're wee, I don't really, like I didn't really know what you would do together in art like. I know that they can't draw, so I don't know, I wouldn't have known what stuff that we could do really and what was the right thing for that age? (parent).*

The last theme is the FINAL ART WORK itself. Art making may be unique as a form of play in having the potential for a final physical end product and this was something the parents seemed to value.

> *I liked that 'cause you got the end print to keep and aye it was nice to have, like to have that, to have something that felt like a thing that we'd keep (parent).*

The large number of images showing final art works also connected to this theme (e.g. **Figure 11**), including some images where parents had displayed the work in their home.

Some parents described how the art works were a nice memory of doing something together—which we felt was the way a final art-work **represents memory of connection** and this is able to extend the experience beyond the session.

> *what I notice is I can then look back on stuff that we've done together. So like you know, a few weeks before, and that thing is still there and it's a nice, It's a nice thing to have and like to put up (parent).*

This may also be a memory for the infant, with one parent describing putting their art work up for their baby to see.

> *I've managed to put a couple up and there's one, like in a bit where it's like her space, there's something that she's*

FIGURE 11 | Final art work, hand and foot prints.

done. I do not know if they recognize it, but certainly something colourful that's theirs (parent).

By having a final product which can be given to others or shared as a photograph, parents described the art works help **connecting to family/friends beyond the dyad.** Many parents were giving pictures as gifts to friends and family, especially grandparents. There were also a lot of comments about sending photos or sharing these on social media.

I think people even when like when I send people photos of us doing, um me, my baby, doing art together. Everyone that I sent a photo to all said please can you send me some and they really appreciated getting it and it was nice to make it and it was kind of a talking point that wasn't just about, oh look, she's able to, you know, I don't know, she was laughing today or something'. Like it was something else to talk about that was about the baby and sort of involved other people (parent).

This aspect seemed particularly important given that lockdown restrictions had limited contact with family outside their own home. A subtheme which extended this idea was about how the final images gave parents something **positive to share.** Some parents talked about how little they were doing during lockdown so this gave them something interesting to share and for others it was about having a positive where their family might be concerned about them or they might usually be sharing negative aspects of parenting.

to share something nice that was going on. I think sometimes, if I was speaking to my mum on the phone and just probably all I was saying was like how bad everything was all the time and she's not seeing anything good, so this was like, the nice side of being a mum and the nice side of the stuff that we're doing and I was getting to share some of that with her. So I think she was relieved as well to see that it wasn't all bad that there were these nice bits (parent).

Resulting Impact on Connection

The final group of themes all capture changes following the intervention, which may impact upon connections between parent and infant. The theme of CHANGES FOR PARENTS INCREASING THEIR CAPACITY TO CONNECT was about parents describing changes in themselves which we see as signs that they would be more available for connection and that their capacity has increased. Parents described how receiving the art box helped them to **feel supported**. Additionally, the referrers also said that they appreciated having something they could offer to support parents when they were restricted in their contact.

made me feel like I was able to do something to help the families as well. Because we all felt a bit helpless at that point. And we couldn't go out. We usually have a lot of information to give to families so I was actually quite nice to say "would you like an art box?". It was a nice thing to be able to do. It was nice to feel like we were helping them (referrer).

A lot of our informal feedback was messages from parents with general expressions of appreciation that reflected a feeling of support through the boxes.

We really appreciate your care and love for our kids (parent)

One way in which this feeling of support manifested in the parents' comments was in their descriptions of how they had felt thought about and in comparisons of the art boxes to a gift.

We did that, we opened the box together, and both of my children and we open this together and look through what's there. We feel just blessed to receive this. We, we felt that we were thinking of (parent).

Images we received also connected to this theme, where the image was of the parents and infants receiving the boxes as opposed to using them, for example, images of a dyad together holding the box. We also had several photos where infants were pictured in the process of opening the boxes (**Figure 12**).

Parents enjoyment and improved wellbeing was something described by all participants and that would make them more available for connection. This included more general increases in wellbeing and mental health from enjoyment of the activity

I feel better doing it as well. Like I'm also having more fun. Not so bored. I'm just enjoying it. It's a nice thing to do together (parent).

as well as specific improvements to issues around lockdown such as feeling less lonely or feeling more positive about their situation.

it did actually make me feel just a bit better that everything, not everything is all doom and gloom, you know? (parent).

Parents mentioned lowering their stress and feeling calm or more relaxed, including some specific comparisons to therapy.

you're feeling more like more like relaxed or that because I'm not trying hard to try and find something. It's like something that's easy to play with her, you know, like so feeling like not like stress (parent).

A connected subtheme captured **feeling good enough as a parent**. Parents had described some guilty feelings about their parenting and several parents described the boxes as helping them to feel like they were offering enough or doing the right thing, what we might think of as 'good enough' mothering.

I think I feel more positive. I feel that I'm doing a good thing for my children. Where I felt while we were at home with no things to do that maybe I'm not doing a good job for them and that they are not getting all the things that they need to do, to try. So for doing this I feel that I have done something for them and that makes me feel good (parent).

Another way in which wellbeing was increased was by **distracting from difficult feelings.** By having an activity to keep busy with parents described that this took them out of their worries

Like if the day is a bit stressful or something I guess it takes you out of your head a bit, doesn't it (parent).

We heard that **parents feel confident to make art with their infant** following the intervention.

I feel a bit more confident now I've had some ideas about, like ideas to copy. I know that he can do it, so I feel a bit more brave, to like, look up an idea on the Internet. And you see sometimes on Pinterest there's like ideas of things you can do with their wee feet and that kind of thing, and so, now we've got the paint and I feel that, like, I know that we'll manage. It's nice to be able to do those (parent).

This increased confidence was really evidenced by both parents and referrers who spoke about ways in which they had been able to adapt the activities or continue on trying new ideas.

now I feel like I would be able to do more of that kind of stuff like make up ideas. Like we were already made up ideas of stuff. Really, he did the handprints and then I was making them into animals and that. So now I feel like I could make up more ideas of what we could do using it than before (parent).

Every parent interviewed said that they had either already continued on making art together after working through the ideas or they intended to keep going when they finished. This will provide ongoing opportunity for connection once the intervention is finished.

It's definitely changed and made me realize that I can do more with even at young baby. Then I thought, um and actually I enjoy it a bit more than I thought as well. Like I'm not really a sort of perhaps someone whose practical and kind of I'm creative, but I don't do things like that myself, but I would now much more. I think before getting

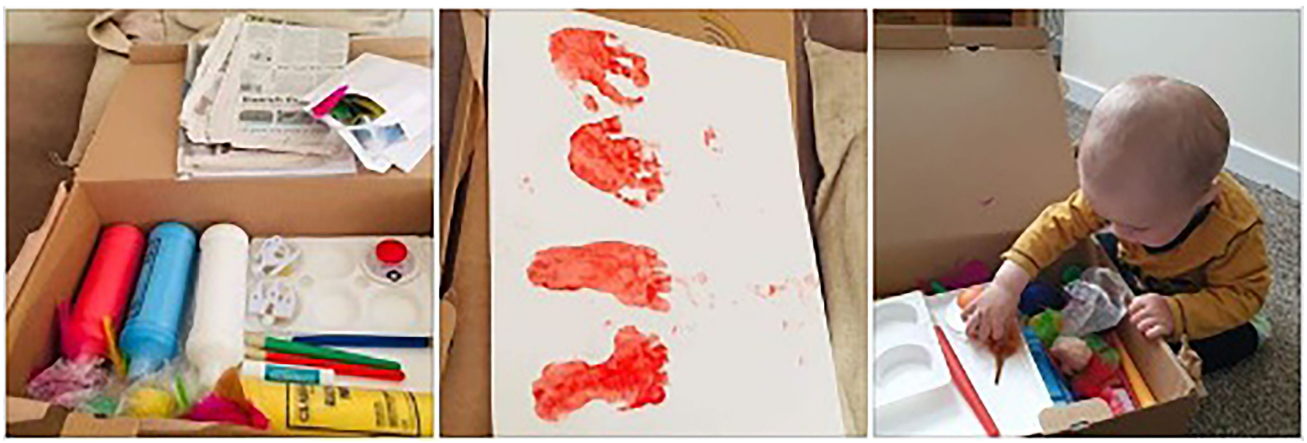


FIGURE 12 | Image shared through social media of infant opening box.

the box, I probably wouldn't have done so much, particularly because I wasn't able to go to like baby groups where I might have been introduced to it. Yeah, so it's been really valuable for me. And I think, like my baby as well. I think it's really nice that she will now grow up like having done that sort of thing and hopefully we can keep doing it together (parent).

The second theme covers the CHANGES OBSERVED IN THE INFANTS. The parents all commented on seeing their own **infant's enjoyment** of the process, describing the playfulness they saw and infants appearing happy.

I think like having more fun, you know? He was more… It is more like playful, and I'm happy seeing him get to do something. Like he's having a fun time. Do you get me? (parent).

Parents also noticed that their infants were showing **increased interest and confidence**. Examples of this included them being more interested in feeling the different materials, or in making marks.

Yeah she got braver, messier, the more we did it. Like to start with she was barely touching it, you know And then after a couple of times doing it she was just getting really brave and she was just sitting about in her nappy covered in paint (parent).

One parent related this to her baby feeling more confident generally as well, and an improved experience when she was in nursery. A parent also observed that their babies concentration increased and one that their language had improved as she learned words related to the materials.

I would think that maybe she got more confident to do it, and went to where it was, something that she would ask for. It's funny, I notice her, also like she probably started talking more while we were doing it. Like, we were trying to see like the names of colours and stuff and she was saying the names and, and, probably talking to me more and to her sister (parent).

Parents described infants getting more excited or lively when they were getting the activities set up—what we would consider to be **signs of anticipation**.

She would be like excited if she saw me getting out the box him like as if she knew 'cause I kept all this stuff in the box, using it as storage, and then when she would see me go to get that, I think she knew now what we were going to do and she was excited. That was really nice and yeah I guess like she, she seemed more interested in it and more interested in the different things (parent).

These observations show that the infants have experienced the art boxes in a positive way and that they are looking forward to having another experience.

Parents also described **signs of agency** in their infants, by which we mean that infants were able to see cause and effect from their actions in the world around them, through making choices about materials, painting their own feet or deliberately trying to make marks. Art making seems to be a medium which has a lot of potential for infants to express and recognise their own agency.

…you see them holding the brush more and trying, trying to do the paint trying, trying to make, to make this…sorry, trying to make the line with the paint (parent).

There were also observations of the infants trying to get their parents to do tasks for them and follow their lead which shows they feel agency and ability to express this to another.

…like always trying to get me to join in as well, so if, like I looked away and was on my phone or something he would turn around and give me something that I should be doing to do (parent).

The final theme, and most directly reflecting changes in the quality of connected experiences, is about CHANGES FOR THE DYAD. The first of these changes was an **increased playfulness** with parents reporting that they were having more fun together and being different to how they might normally behave during play.

Maybe because I'm enjoying it too and she knows so she did, you know, like we're both like smiling and that. Like, you know, like being silly with it. Maybe… like, more like, funny, playful like that together (parent).

This would reflect a positive change in the infants' experiences with their parent that would enable more feeling of connection.

Parents reported their **increased parental presence in shared activity**. The art making was described as something to be done together and parents were spending time where this was their main focus. They described how sometimes play with toys was about keeping infants occupied while they do other tasks whereas this was something where they gave it all their attention and were active participants. They saw their infants responding to this increased involvement positively.

I think of all their toys as their toys for them to play. Whereas for this art it was a thing for us all that we were meant to all do together. And that's different. Not something to keep them busy, maybe while I'm cooking. More, more sharing (parent).

A number of parents also described turning off the television to do the activity so again giving more focus to their child.

Yeah, like normally I guess I probably have the TV on, but because I wanted them to like concentrate on what we were doing, I turned that off. So it meant I really noticed when she was saying stuff (parent).

Some also described the physical set up as being different as this was an activity where they were down on the floor with the baby and were needed to offer physical support. These different ways that parents increased their participation in play will have increased the potential for moments of connection.

Parents described specific examples of behaviours that they saw from their infant which are signs of **increased shared attention and eye contact**. These included examples where infant referred back to their parent, made eye contact, or initiated joint attention where both look at the same thing together.

> *like he'll pick something up like a brush and then he likes to show the brush to me and then put it in the paint and then he looks at me, you know? (parent).*

There were also examples where parent and infant were engaged in the same task – what we would call shared goals.

> *I would put my hands in as well to show her what to do and I know she likes it. She's like making a painting and then looking at me. And then I'm gonna showing her what to do and that so we're like doing it both of us (parent).*

These are direct examples from parents of the specific moments where they are connecting as a dyad, that have been facilitated by the art making.

DISCUSSION

Our thematic analysis was able to capture some of the mechanisms for change within the art process. By giving materials, ideas, information and encouragement, the art boxes were able to overcome some of the barriers to positive interactions which parents described in their lives, drawing dyads into positive playful interactions. Some themes captured perceived mechanisms which we had been hoping for in the box design, such as providing activity to promote meaningful time together. Other themes we had not anticipated: for example, parents placed importance on being able to share with others beyond the dyad, either by including other family members in the art making, or in being able to share images of the art making with friends and family *via* smartphone. This may reflect something particular about this time during the pandemic (where older children also need attention, but conversely other family outside the home feel distant). However, sharing may have been an important aspect for these families anyway. Art works may be symbolic of a positive experience and by sharing the art works they are able to share this sense of themselves and of the dyadic relationship as positive. We might connect this to the theme of the 'good enough' parent and a desire to capture and share positive moments where they felt they were doing a good job, both for themselves and for their family members.

We were also surprised by some of the images returned. While we had expected to see images of some final art works, and pictures of infants trying out the art and looking adorably messy, we had not expected to receive images that documented all the different materials or the actual moment of receipt, and opening, of the boxes themselves. This shows us one way in which the images were able to draw attention to areas of the intervention which had been important to the families, through their choices of what to share. In these cases, we interpret the images of materials as capturing the high value participants placed on receiving the art box resources, and the barriers these families face in accessing such materials themselves. Having material art resources which are age appropriate and available in the home is important to facilitate this kind of play, so this highlights that any intervention aiming to encourage art making (i.e., *via* online content) without providing these materials is insufficient. The images of receiving the art boxes helped us to understand numerous participant comments which described the boxes as 'gifts' and 'blessings'. In our interpretation, these both indicated different ways of expressing the value placed on being given the boxes, and how they helped parents to feel 'thought about' at a time when they perceived supports to be withdrawing, and some felt 'forgotten' as parents at home with young children.

In those themes focused on impact which describe changes for parent, infant and dyad, we are able to think about the ways in which art making may be well placed to maximise connections between parent and child. Without necessarily thinking in terms of their interactions, parents had made clear observations of moments of intersubjectivity between them and their child; those moments where their infant was able to express an interest and share it with them (Trevarthen and Aitken, 2001). What is positive is that parents reported responding to these connection-seeking opportunities, and also that they themselves experienced positive feelings from these interactions. This shows the potential within art making for interactional synchrony (Isabella and Belsky, 1991) where parents offer well timed responses and the dyad are having reciprocal, and mutually rewarding interactions. The evidence from the parents' own perspective of feeling increased wellbeing may have allowed them to be more mentally present and available for this kind of interaction. These kinds of synchronous exchanges are fundamental in building strong attachment relationships (Svanberg, 1998). If art is able to facilitate these ways of relating, then we could potentially have a long-term impact beyond the intervention. The signs of anticipation from the infants shows they have come to expect a positive experience with their parent and the art box, and suggests positive associations to their parents, at least within this context.

It was interesting to see parents highlighting the changes that they saw in their infants. Some of these, such as infants showing agency, may seem to be more about the infant's own psychological development. Indeed, they may indicate that the art making process is well placed to facilitate change in the infant's capacity in these developmental areas. However, we would argue that parents noticing these changes, is itself a strong sign of potential for connection. All these changes reflect development of the infant's sense of self (Rochat, 2003). When the parents are able to notice these behaviours they are

recognising their infant as an individual with their own sense of self, with whom they then have the potential to connect on an intersubjective level (Stern, 1985). As art making is a new experience for the infants, with textures and colours to explore, it prompts clear reactions from infants, and may encourage parents to be curious about their infant's experience. In this way art may be ideally placed to encourage parents to mentalise—where they are able to reflect about their infant's mental states and intentions (Fonagy et al., 2004). This 'mind mindedness', where an infant's behaviour is seen as meaningful, is shown to be associated with strong attachments (Meins et al., 2001). Working to increase parents reflective capacity can be successful intervention for attachment difficulties (Suchman et al., 2011) and is a focus within art therapy (Armstrong et al., 2019) so it is interesting to think art could have this potential outside of a therapeutic setting. We would suggest that this would benefit from further exploration.

We have looked at our results through our perspective of infant development but there are other perspectives which could also add insight, for example those from positive psychology which consider wellbeing. Fredrickson (2004) describes how positive emotions may 'broaden' an individual's repertoire of responses, a potential mechanism for change from using the box. Parents identified a number of positive emotions such as confidence and fun, which may have increased their repertoire of playful responses as well as allowing increased attentional resources to be directed towards their children. Crucially as the nature of this theory is cyclical, the broadened responses then in turn increase positive emotions. The same may be true for the infant participants who parents observed displaying a number of positive emotions such as excitement and joy. Frederickson considers that the experience of these positive emotions will also increase individuals' psychological resources over time. The art boxes could also be seen to facilitate both parent and infant's 'Basic Psychological Needs' as highlighted within self-determination theory (Vansteenkiste et al., 2020). Within this theory wellbeing is fostered when the universal needs of autonomy, competence and relatedness are met. It is clear from the descriptions of families' experiences how the art boxes could be seen to create conditions conducive to relatedness by bringing dyads, and their wider family group, into rewarding interactions. Similarly there is a clear development of competence, both for the infant who develops mastery of the materials, and the parent who feels increased confidence in ways to play and use materials, as well as their feeling of competence as a parent—as evidenced in their comments about feeling they are doing a good job. Although the activities were guided, the boxes could be seen as providing the opportunity for autonomy; parents were able to draw on our resources to create activity within their day. For the infant, autonomy connects strongly to those signs of agency where infant's see their own impact on the world in their mark making, which we have highlighted in the themes.

If arts activity can be shown to create positive change for parents-infant dyads, then this could be a valuable tool for improving relationships. This intervention was not one that we had planned, but was an adaption to a very specific set of circumstances. It is very different to what we would offer in 'normal' times. We are very mindful of the importance of the therapeutic relationship in art therapy and the containment offered by the art therapist themselves. We also recognise benefits from taking part in a group where there is a collective sense of support from all the families involved and also shared learning. Although a home-based intervention undertaken as a family unit is very different from our usual approach, we have found the results to be surprisingly promising. It is possible that the specific conditions of lockdown, with limited other distractions, actually gave an opportunity when parents were more receptive to this kind of intervention that encourages particular activity with their children. Nonetheless, we are encouraged to reflect on whether there may be potential for this to have benefit which extends beyond the context of lockdown.

One potential criticism is that, by explaining the benefits of art making in our guide, we were potentially predisposing the parents to find them beneficial. However, from our perspective this is a valuable part of the intervention itself, where that element of psychoeducation may act as an important encouragement to take part and see the value for their infant. Indeed, this was highlighted by the parents themselves within the theme of encouragement where parents reported that this push was useful. Another point to note is that we are not able to separate out the different aspects of the intervention, to find a primary mechanism of change. For example, it may be that the difficult feelings which parents related to us (particularly that they had been unsupported during the pandemic), were addressed by the supporting gesture of the box, as much as by the art activity. This does not have to be a negative, as we would see the art box as offering something holistic. This is equally true with traditional art therapy intervention, where there are interconnected benefits from the relationship with the therapist, the social support from the group, the direct psychological intervention, as well as the involvement with the art materials and the creative process. The themes from interviews seem to suggest that there were multiple actions at play for the families from this intervention, although the art process seems to be central in that as a mechanism of bringing dyads into interactions. Potential future research could look at comparing similar interventions using different vehicles for interaction, such as art materials, toys and music.

When thinking of implications for future design we are cautious to suggest that remote intervention, without the presence of in person support, would be sufficient where families present with a high level of need, such as those struggling with mental health difficulties. However, it could certainly be an adjunct to other services. Moreover, we would argue that there is a general need among parents, especially those facing disadvantage, to be supported in building positive relationships with their children. We are aware that there are limited resources within health and social care for supporting families of young children, and for families who do not 'fit' referral criteria (e.g., because their problems are systematic rather than related to mental health). Taking a universal approach to encouraging playful

interactions using art may be a way to reach families who would not otherwise meet the criteria for support, but who none the less may benefit. The art boxes have shown that with a bit of a nudge to take part, parents were able to see the benefits. This is how we have chosen to take the project forward ourselves, where our next step after this research was to bring in families to help us co-design a book resource on getting started making art with very young children, expanding from the ideas in the art box guide. Our other follow on from the boxes, in 2021 as restrictions continued, was been to use them with voluntary groups in a hybrid format, where we sent the boxes out in advance and then came together to start using the materials in an online session. This was particularly useful with groups where English was not their first language. However, in this case the partner organisation was able to organise a secure internet connection for every participant, without which we would risk excluding some families and heightening disadvantage, so careful consideration is required to use them in this way.

Art seems to be an ideal vehicle for shifting ways in which dyads relate as there are mechanisms for change that are naturally occurring in the process. In which case, how are art organisations able to facilitate more access to art making for families with very young children? It was interesting to observe that while few parents had made art with their children before the intervention and none had used the art venue we are based in. Following the intervention they all continued art making, or planned to do so. This suggests the boxes are a potentially useful way to widen participation and address inequalities of arts access. In turn, the arts in health benefit of such increased involvement is supporting early years development and parental wellbeing by creating opportunities to mechanise positive change within the art process. When interviewees were asked at the end of the interview about their plans to visit the gallery some of their responses highlighted perceived barriers to participation. Although some parents were definite that they wanted to go, some were initially concerned about their infant being too young, or too noisy, or that there may be an associated cost. We were able to explain that the gallery was free and that there were activities specifically for all ages, which seemed to alleviate their concerns. This highlights the need to reach out to families with this kind of information if we want to widen participation. It was a limitation of the study timing that the gallery was actually closed over the interview period due to COVID-19 restrictions, so the information parents shared about plans to visit had to be speculative. It would be useful in future to pair a similar intervention with a follow-up measuring gallery visits to investigate if this did increase attendance.

The last point for discussion is about the usefulness of different kinds of evidence when looking to evaluate an arts-based intervention. Although overwhelmingly positive, we found the quantitative feedback from postcards, that we have included in **Supplementary Material**, to be of limited utility in understanding more about the mechanisms and impacts of the intervention. In contrast, the analysis of interviews gave an extremely rich picture that was able to describe nuances within the intervention process and detailed observations of parent's perceptions of changes. However, we acknowledge the limitation of not having baselines to the interviews, or standardised pre- and post-intervention measures which may have allowed us to quantify change. It is also unfortunate that we were unable to make any comparisons with different demographics, such as age, single parent status, levels of deprivation or ethnicity. It is therefore still an open question 'for whom' the intervention is effective, although we have a broad picture of the characterisation of our sample. Thus, we would argue that future trialling of this form of intervention might usefully employ mixed methodologies, combining interviews with robust quantitative approaches. Broader quantitative approaches would help us to generalise from the experience of the smaller sample of participants in interviews, and also to address some of the limitations relating to self-selection bias among participants agreeing to be interviewed. Nonetheless, we would argue that gathering the participant voice is a critical first step, often missing in positivist approaches.

CONCLUSION

Our findings show parents reporting feeling more confident and undertaking new activities which they plan to continue. This was of particular importance during the 2020 lockdown where parents reported that their opportunities for different experiences became severely limited. Parents described having positive playful interactions using the art materials and reported improvements to their own wellbeing from doing creative activities together with their child. Analysis of these interviews gives a framework for the barriers to connection which they were facing, for how the art box intervention can facilitate moments of connected interaction, and for the impact this can have on the attachment relationship. Our analysis provides promising insights into the mechanism by which this particular scheme has benefitted parent-infant relationships, and suggests that there are attachment benefits from dyadic arts participation. This offers a novel pathway for arts organisations seeking to open up access to art making for disadvantaged families in order to offer arts in health intervention for early relationships.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Dundee, Schools of Social Sciences and Humanities, School Research Ethics Committee. Our study

involved infants in the intervention and the research was conducted with parents. Consent was given by parents for referral and when completing questionnaires (which were optional) and they were provided with a comprehensive participant information sheet. Due to interviews taking place by phone within COVID restrictions, parents provided verbal consent at the outset of the call. As interviews were recorded we have a tangible record of informed consent, fulfilling national and local requirements. Written informed consent was obtained from the individuals' and/or individuals' next of kin for the publication of any identifiable data or images included in the manuscript.

AUTHOR CONTRIBUTIONS

VA designed and ran the intervention, collected and analysed the data. JR supervised the work and was second coder. All authors contributed to the article and approved the submitted version.

FUNDING

The initial stage of this research, delivering art boxes to the first 40 participants, was funded through a University of Dundee, Social Sciences, Phd studentship. The second stage for all subsequent referrals was funded by Wellcome Trust seed funding (grant no. 204816/Z/16/Z), awarded by University of Dundee to the author VA.

ACKNOWLEDGMENTS

We would like to thank our reviewers for helping us to refine this paper. In particular, we thank our reviewer for pointing out connections between our findings and the 'Broaden-and-Build' and Self-Determination theories which helped us expand our infant development perspective to frame our interpretation within a broader context. Lastly, but most importantly, we would like to thank all the parents and little ones who took part and generously sent us images or spoke with us by phone. This has been a very strange and difficult time to have a baby, but you have all done amazingly well!

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.732562/full#supplementary-material

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ORIGINAL RESEARCH
published: 30 June 2022
doi: 10.3389/fpsyg.2022.782033

Can a Brief Interaction With Online, Digital Art Improve Wellbeing? A Comparative Study of the Impact of Online Art and Culture Presentations on Mood, State-Anxiety, Subjective Wellbeing, and Loneliness

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When experienced in-person, engagement with art has been associated—in a growing body of evidence—with positive outcomes in wellbeing and mental health. This represents an exciting new field for psychology, curation, and health interventions, suggesting a widely-accessible, cost-effective, and non-pharmaceutical means of regulating factors such as mood or anxiety. However, can similar impacts be found with online presentations? If so, this would open up positive outcomes to an even-wider population—a trend accelerating due to the current COVID-19 pandemic. Despite its promise, this question, and the underlying mechanisms of art interventions and impacts, has largely not been explored. Participants (N = 84) were asked to engage with one of two online exhibitions from Google Arts and Culture (a Monet painting or a similarly-formatted display of Japanese culinary traditions). With just 1–2 min exposure, both improved negative mood, state-anxiety, loneliness, and wellbeing. Stepdown analysis suggested the changes can be explained primarily via negative mood, while improvements in mood correlated with aesthetic appraisals and cognitive-emotional experience of the exhibition. However, no difference was found between exhibitions. We discuss the findings in terms of applications and targets for future research.

Keywords: cultural engagement, receptive art engagement, wellbeing, mental health, digital art, art viewing

OPEN ACCESS

Edited by:
Stephen Clift,
Canterbury Christ Church University, United Kingdom

Reviewed by:
Daniela Villani,
Catholic University of the Sacred Heart, Italy
Dorina Cadar,
Brighton and Sussex Medical School, United Kingdom

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *23 September 2021*
Accepted: *13 April 2022*
Published: *30 June 2022*

Citation:
Trupp MD, Bignardi G, Chana K, Specker E and Pelowski M (2022) Can a Brief Interaction With Online, Digital Art Improve Wellbeing? A Comparative Study of the Impact of Online Art and Culture Presentations on Mood, State-Anxiety, Subjective Wellbeing, and Loneliness. Front. Psychol. 13:782033. doi: 10.3389/fpsyg.2022.782033

INTRODUCTION

With the spread of the novel Coronavirus around early 2020, governments asked their citizens to stay at home to slow the rate of infection and protect the most vulnerable, forcing large parts of society to close their doors and everyday activities to move online. This included engagement with art and cultural institutions, which greatly increased online access to collections to connect with people now stuck at home (Radermecker, 2020; Samaroudi et al., 2020). Virtual tours emerged,

encouraging people to "visit the museum from their couches" (Romano, 2020) and, for the first time, engaging with art and culture online was on the minds of a broad audience (Unitt, 2020).

At the same time, many online formats of art and culture signaled their potential application for a pragmatic purpose—ameliorating the negative pandemic-related effects on wellbeing and mental health. A number of projects and discussion in the press were built around suggestions that a brief engagement with a few works of art, or a trip to a virtual museum, might help soothe anxiety, boost one's mood (Barbican Center, 2020), provide better wellbeing (International Arts and Mind Lab, 2020), or even help those isolated and lonely (Belvedere Museum, 2020). These aims seem to have been well received by the public, especially by those with low wellbeing and mental health issues, with evidence suggesting that a notable portion of individuals were, for the first time, seeking out online art encounters (Bu et al., 2021).

These developments are not unique. Rather, the present world-wide pandemic accelerated two trends that have come to define the arts' pragmatic application for wellbeing and health: (1) Researchers and practitioners have considered art as a powerful tool to positively modulate wellbeing, which is widely-accessible, cost-effective, and non-pharmaceutical. In a growing body of evidence, when experienced in-person, engagements with art have been associated with positive outcomes (Fancourt and Finn, 2019 for review). (2) With the ubiquity of the internet, it is being increasingly recognized that digital, online formats might reach an even wider audience and present new possibilities for health-related use. If online engagement could provide a systematic impact, this would represent an even more cost-effective means of reaching large numbers in society (Clayton and Potter, 2017; Thomson et al., 2018), especially individuals who cannot visit museums, bringing doses of art into homes, hospital beds, or places of work without installation of a costly artwork. As put by one museum director (Gilman, in Rice, 2020), summarizing these dual trends changing the role of the arts, "right now, art. . . [is] more important than ever. It is one of the key things sustaining us while we are cocooning at home," especially in its new online presence, ". . .it is what will nourish us as we adjust to the new normal of a post-COVID-19 world."

However, despite this promise, this also raises several questions that have not seen much empirical research: *Can art or cultural engagements actually impact mental states such as wellbeing, state-anxiety, mood, satisfaction with life, or loneliness?* If so, *in which ways* and *by how much?* An answer to these questions has immediate pragmatic importance and raises important issues about the role and nature of typical art interventions, the potential importance of "real" artworks, and which factors might be key when considering impacts on wellbeing. Similarly, especially considering the wealth of *other* interventions that might be found online—*how does online art stack up against similar, non-art cultural engagements, such as other materials that might typically be found in museums and are similarly moving to the digital realm?* Is there anything particularly different about engaging with visual art? Further, this topic raises several tangential questions of interest, regarding how the nature of the art experience, and appraisal of an online exhibition might maximize or unlock specific wellbeing outcomes.

This is the aim of the present paper. Employing a quasi-randomized design in which individuals, via the internet, engaged briefly with art content (impressionist painting), we explore the potential impact on a number of factors—wellbeing (mood, life satisfaction, and subjective wellbeing), state anxiety, and loneliness—measured before and after viewing. We compare this intervention to another type of online cultural content (a display of Japanese culinary traditions), which employed a similar presentation format, but was generally expected to be seen as "not art" by participants and aligning more with receptive engagement such as visiting a history or science museum. We also consider secondary topics in an exploratory analysis, such as the nature of the experience at the appraisal and cognitive-emotional level, individuals' label of the stimuli as "art," and the interrelation of dependent wellbeing variables.

BACKGROUND—(ONLINE) ART AS A WELLBEING INTERVENTION

The argument that art, in an online format, *could be* a tool for addressing wellbeing and mental health can be traced through past research; as can many outstanding questions.

Engagement with a variety of forms of arts and culture—*in person*—is now well-documented to support wellbeing and mental health. A 2019 World Health Organization review, included, for example, results from more than 900 publications (Fancourt and Finn, 2019) suggesting that engaging with various artistic or cultural activities can lead to meaningful impacts both in regards to preventative capacities (maintaining physical and mental wellbeing) and in support of a wide range of psychological issues. Among the many possible receptive or creative interventions (attending performances, making or viewing visual art or music, etc.), visually engaging artwork or visiting museums and galleries have increasingly been employed in partnership with public health initiatives, and healthcare providers in several countries have started to prescribe such activities as psychological health interventions (Packer and Bond, 2010; Camic and Chatterjee, 2013; Chatterjee and Noble, 2017; Todd et al., 2017; Thomson et al., 2018).

Among the various effects, empirical evidence has shown that on-site art interactions have been particularly associated with decreased loneliness by providing museums as spaces to learn and socially engage. This type of sustained engagement with institutions like art museums over the life span is associated with feeling less lonely and having greater levels of eudaimonic wellbeing (Todd et al., 2017; Tymoszuk et al., 2019, 2020). Further, participation in arts and cultural leisure activities was associated in cross-sectional studies with greater life-satisfaction, and mental health in a cohort of 8200 Norwegian adolescents (symptoms of anxiety and depression; Roberts et al., 2011; Hansen et al., 2015; Clayton and Potter, 2017). In many studies, the impact on mood and subjective wellbeing has also been illustrated. For example, in paradigms eliminating the activity

of visiting a museum, Nanda et al. (2011) showed that simply hanging paintings of restorative nature scenes in common rooms led psychiatric patients to have reduced agitation (as reported by nurses) and need for anxiety medication compared to days without the paintings. Similar studies of art in patient or common rooms have been found to improve the anxiety, stress levels, depression, mood, and general wellbeing of both patients and staff. Further, the addition of a contemporary art gallery or bringing art to the patient's bedside in a hospital, allows staff, patients and family members the ability to access art in difficult times and can lead to better mood and subjective wellbeing (Binnie, 2010; Roberts et al., 2011; Karnik et al., 2014; Hansen et al., 2015; Ho et al., 2015; Bennington et al., 2016; Davies et al., 2016; Wang et al., 2020). In regard to stress and anxiety, similar to the interventions that will be explored in this paper, Clow and Fredhoi (2006) asked individuals to take a 35-min visit to an art gallery on their lunch break and found that even short exposures lead to significantly lower self-reported stress (∼2.4 points on a pre-/post-visit 10-point scale) and cortisol concentrations. Impacts have also been found, see also Kweon et al. (2008), for similar paradigms showing lower reported stress following art installations in an office. Overall, there is a wealth of evidence that in-person art engagement can impact aspects of wellbeing including, subjective wellbeing, mood, anxiety, loneliness, and satisfaction with life.

The explanations of such impacts are themselves under debate (Mastandrea et al., 2019). However, they have been suggested to involve enjoyable or pleasurable experiences (Sachs et al., 2015; Chatterjee and Noble, 2017; Fancourt et al., 2020), which might improve aspects of subjective wellbeing by regulating mood. If this were the case, one might expect that the more enjoyable the experience with art is, the better improvement to aspects of wellbeing. They may be tied to shared social, communal factors (Roberts et al., 2011; Cuypers et al., 2012), escapism or removal from daily routine (see Kaplan, 1995), or even experiences of beauty as part of an aesthetic experience (Fancourt and Finn, 2019; Mastandrea et al., 2019). However, such aspects have received little attention systematically and need further research to examine which parts of art experiences are particularly important to impact wellbeing.

Digital, Online Art—Would This Translate to Similar Wellbeing Impacts?

Online and digital technology *might* offer a natural ability to further empower the use of the arts in health and wellbeing formats. Today, art viewing, cultural engagements, and trips to art or other types of museums can take place via computers, tablets, smartphones and even virtual reality. This would certainly make it possible for many more individuals to engage art (Leng et al., 2014; Bu et al., 2021). Personal media, bringing artworks directly to a viewer could perhaps duplicate many of the same results, especially if beneficial effects are tied to the visual or cognitive-emotional aspects of experience. The potential for targeted, bite-size interactions with augmented information, seen in the comfort of one's personal space without need for extra effort or distractions, perhaps could overcome some of the issues often given for why individuals may not enjoy art (Pelowski et al., 2014), allowing art to be more accessible, understandable, personal, even increasing impact beyond traditional installations or museum visits (Alelis et al., 2015).

At the same time, a long-running argument in especially art-critical, and more recently, psychological discussions suggests that art, for its full effect, might require to be seen in person, and that digital formats or other reproductions lose necessary aspects—immediacy, ambiance, level of engagement or importance, even artwork size—of the experience (Benjamin, 1968; Berger, 2008; Pelowski et al., 2017a; Specker et al., 2021). A handful of studies have suggested that art especially in digital formats, when compared to in-person gallery viewing, may lead to lower ratings of pleasantness (Locher et al., 1999, 2001; Locher and Dolese, 2004), interest (Locher et al., 2001; Locher and Dolese, 2004), liking, time spent viewing (Brieber et al., 2014) or even positive emotion or arousal (Brieber et al., 2015), all of which might be important for wellbeing benefits. Beyond this, if art impacts are driven more by the tangential aspects of an in-person visit—making a special trip, being with other people; even taking a break from everyday life activity or physical exertion itself (McLean, 2011)—these might be lost or diminished in online formats, or may connect to different results, for example, with factors such as life satisfaction or loneliness.[1]

The ability for online engagements to lead to wellbeing-related impacts especially requires further research. To our knowledge, only two studies have begun to provide tentative evidence. Leng et al. (2014) compared cultural activities (cooking and craft exercises) via tablets to traditional in-person activities, finding that participants displayed similar or better levels of wellbeing in the tablet group. Tyack et al. (2017) actually examined if art interventions could be delivered through touchscreen tablets. Assessing dementia patients in their homes; wellbeing (happiness, wellness and interestedness, 1–100 scale) was measured before and after freely viewing a set of artworks (with the ability to select and move between styles) via a specialized app designed for the study. The results showed that after each session of around 20 min, wellbeing increased, although not significantly. These papers conducted their studies with specialized samples of dementia patients, and as part of therapy programs (see also Zubala et al., 2021 for research on digital creative art therapy). Even in-person interventions have, somewhat surprisingly, not typically considered art brought into individuals' homes. However, an ongoing mental health survey, conducted by University College London in the United Kingdom (Covid-19 Social Study, 2020), found a fifth of 70,000 respondents engaged more with the arts during lockdown than before. Those individuals who identified as having a mental illness or disability were likely to engage more in the first 22 weeks, which was speculated to be due to the move of cultural institutions online (Bu et al., 2021),

[1]Interestingly, although one might surmise that a solution to loneliness requires being with other people or engaging at least in communal activity, one of the topics specifically addressed in Covid-19 times-related online art was loneliness, with several exhibitions featuring works on this theme (Jones, 2020; Knott, 2020).

however, this study did not quantify whether such use translated to actual effects.

"Art" Versus "Non-art" Cultural Engagements?

The above issues touch another aspect that we explore in this paper, regarding how engagements with art might impact individuals via online formats in comparison to other varieties of cultural engagements. On one hand, engaging with "art" might be an ideal means to induce pleasurable and enjoyable experiences (Pelowski et al., 2017b). Previous research has found that viewing objects that one believes to be "art" (either via external cues or labels or derived from personal opinion) can lead to higher liking, beauty, pleasure (Locher et al., 2001; Leder et al., 2004; Pelowski et al., 2017b), positive affective experiences (Cupchik et al., 2009; Kirk et al., 2020), and even elicit greater activation of reward-related brain areas (Kirk et al., 2009; Lacey et al., 2011), all of which may lead to greater wellbeing or mood benefits (Berridge and Kringelbach, 2011; Becker et al., 2019). Having stronger aesthetic experiences, which is noted as a possible wellbeing mechanism (Fancourt and Finn, 2019), are likely to be particularly pronounced with art. This may be due to the perspective that one takes when engaging with something that they believe to be art. It is well known that such aesthetic perspectives are more evaluative, appreciative and contemplative of an object (Cupchik et al., 2009), which may specifically be the state that can enhance wellbeing. If the act of stopping to admire is important in wellbeing interventions, as supported by a study by Martínez-Martí et al. (2018) that found that learning to stop and admire beauty was effective in improving wellbeing, art could be much better than another type of engagement as it is, philosophy aside, there to be looked at, contemplated and admired.

On the other hand, wellbeing impacts can be tied to many other types of cultural engagement. For example, the in-person research referenced above is inclusive of a broad range of, often overlapping, cultural activities (see Davies et al., 2016). In just museum visits, one can find, among others, history, or science museums, which have been linked to wellbeing (Wheatley and Bickerton, 2017, 2019). Research has found positive impacts from the simple presence of other visual materials such as photos of nature (White et al., 2010). However, most research to date has not considered the impact of art in direct comparison to other types of cultural engagement in terms of health and wellbeing, and such distinction and comparison is argued to be a target for research (Ander et al., 2013). This is especially true with the internet, where there is a wealth of activities that offer potential wellbeing benefits (e.g., Son and Lee, 2021 for a recent study on stress and online shopping).

Summary of Research Questions

To summarize, our main research questions include: How does art and cultural engagements impact mental states such as wellbeing, state-anxiety, mood, satisfaction with life, and loneliness? Second, how does online art compare to a similar, non-art online cultural engagement?

In addition, we examine the importance of several other dependent and independent factors in assessing the impact of online art, each of which, we address in our results section as *post hoc* and exploratory analysis.

First, we address if there are specific relationships between the different aspects of wellbeing outcomes (i.e., mood, anxiety, loneliness), which can also help to define the mechanisms underlying interventions. For example, past research has suggested that some aspects such as mood or state-anxiety may be particularly variable to immediate fluctuations in the environment, like an art intervention (e.g., Fredrickson and Branigan, 2005). These factors may then subsequently contribute to changes in more complex cognitive states such as loneliness and evaluative aspects of subjective wellbeing or life satisfaction and call for consideration.

Further, we explore how outcomes can depend on differing aspects of the individual's experience. Research suggests that individuals' reactions to art, and likely all forms of culture, are quite subjective (Pelowski et al., 2017b). Most basically, regardless of what kind of cultural engagement, this involves appraisal aspects such as whether one would like to visit again, finds beautiful or meaningful what they are engaging with.

Similarly, research has shown that—at the emotional and cognitive level—individuals respond differently to the same artwork. For example, the extent to which an engagement with art is more or less intellectually stimulating, educational, novel, harmonious, or boring, among other felt emotions (Pelowski et al., 2017c for review). Here we examine how these factors also differentiate impacts to wellbeing.

MATERIALS AND METHODS

Participants

To test the above questions, the study included a final sample of 84 participants (65 women, 17 men, 1 other, 1 unknown; M_{age} = 34.89, SD = 14.47, range = 21–74). Participants were further divided between two conditions of cultural engagement, with 40 individuals (31 women, M_{age} = 35.40, SD = 14.44, range = 22–74) exposed to an "art" condition (see below) and 44 (34 women, M_{age} = 34.43, SD = 14.64, range = 21–72) exposed to a "non-art" condition. Participants were recruited as a convenience sample through advertisements on social media and consisted of nationals from Europe (43%), the Americas (48%), Asia (8%), and Africa (1%). They received no compensation for participation. They engaged in the study between April 17 to June 6, 2020 during the first wave of the COVID-19 pandemic when most nations had instituted various degrees of lockdown.

The final sample was derived from an initial sample of 143, with participants removed due to exclusion criteria (see section "Results"). The study followed the ethical standards of the Declaration of Helsinki and the University of Vienna ethics board.

Stimuli

The online cultural engagement conditions consisted of two interactive exhibitions, broadly argued to be generally thought

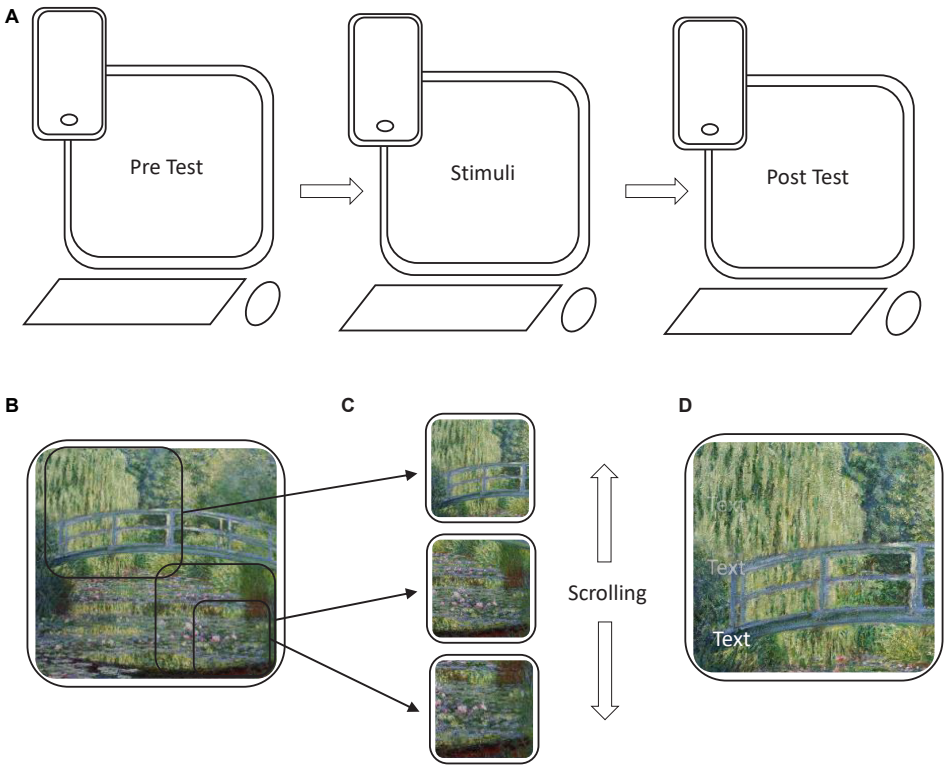

FIGURE 1 | Study design, stimuli composition. **(A)** The procedure was a pre-post design which could be taken on both personal computers and smartphones. **(B)** Demonstration of stimuli showing "Waterlilies condition" as an example depicting Claude Monet, The Water-Lily Pond, 1899. (Oil on canvas, 88.3 × 93.1 cm. public domain image, Wikimedia commons). Stimuli from Google Arts and Culture were interactive, where smaller compositions of one main image **(B)** could be scrolled through **(C)** with accompanying text that faded away when scrolling down **(D)**. Available from: https://commons.wikimedia.org/wiki/File:Water-Lilies-and-Japanese-Bridge-(1897-1899)-Monet.jpg.

of as "art" and "non-art," counterbalanced between subjects.[2] See **Figure 1** for stimuli examples and **Supplementary Materials** for an access link and all accompanying texts. Both sets of stimuli were selected from Google Arts and Culture, a free online repository of virtual art galleries, interactive experiences, and educational materials on a range of topics covering culture, history, and art (About Google Cultural Institute, 2020), and consisted of a single visual image which could be appreciated by itself, as well as zooming in on various details accessed by scrolling with the mouse. Though the order of details was predetermined, the participants had the autonomy to scroll up and down as they liked. Each detail was accompanied by related text (e.g., "...This is one of 18 canvases of this view in differing light conditions..."). Thus, in both cases they were aimed at duplicating what might be an engagement with a single painting or exhibit, where one might move forward or backwards and read accompanying labels or materials.

For the "art" condition (hereafter, "Water-lilies condition"), we used an exhibition of *Monet's The Water-Lily Pond; An in-painting tour from the National Gallery, London* (Google Cultural Institute, 2020). This displays the single painting *(The Water Lily Pond,* 1899) of a bridge over a water-lily-festooned pond in Giverny, and was chosen because landscape and waterscape artworks have been suggested to be especially useful to reduce stress and anxiety among both patient and non-patient populations (Ulrich and Gilpin, 2003). The accompanying text in each frame focused on painting features (color, brushstrokes) or contextual information about the artist and painting.

The "non-art" stimulus (hereafter, "Bento condition") was *A Bitesize History of Japanese Food; Explore a mouthwatering box of Japan's iconic cuisine* (Google Cultural Institute, 2020). This explored a diagram in the shape of a bento box, containing photos and facts introducing the viewer to the history and traditions of Japanese food, and included images of food and food-related activities, such as harvesting or drinking. The text covered aspects of Japanese culture, including origins of specific dishes, agricultural traditions, and food preparation.

Procedure

The study employed a mixed Two (Time: pre vs. post, within-participant) × Two (Online Cultural Engagement: art vs. non-art, between-participant) design. Participants were supplied with a survey link via Qualtrics, which led them to a short description

[2]Note, we are not making any ontological claim regarding the definition of art, however, we selected our stimuli so the painting was an example of objects highly popular and well-known to the general public as fine art, whereas the non-art condition had no clear connection to art and was focused on a different aspect of culture, namely the cultural/history of food.

of the study. The description noted that the study was designed to test participants before and after they freely explored an online exhibit, and the types of experiences that could be engendered. After agreeing to participate, participants were first asked to provide demographic information, and then completed a pre-viewing baseline measure of our dependent variables. The order of the scales for both the pre-viewing baseline and the post test was randomized for each participant to avoid any sequence bias. Upon beginning this, participants were also already assigned, unbeknownst to them, to one of the two types of online engagements, with the general description being the same for both the Water-lilies and Bento conditions. In both cases, we refrained from using the term "art" but rather referred to an "online experience" or "exhibit" in all instructions. Participants were explicitly instructed not to enter any other parts of the website or other webpages and to return to the post survey once finished. They were then presented with a hyperlink button which, upon clicking, would open either the art or non-art Google Arts and Culture exhibition in a new window, where they were able to spend as much time as they liked viewing and interacting with the stimuli.

Pre-viewing Survey – Demographics and Personality, and COVID Related Conditions

In the pre-study survey, participants provided demographic descriptions (age, gender, nationality, location of current residence) as well as the status of their lives during the present lockdown, including lockdown severity (ranging from "I am staying only in my personal residence" to "I am not in lockdown at all," see **Supplementary Table 1**), duration, and number of other people living in the participant's residence. The Ten Item Personality Inventory (TIPI) was used to assess personality traits (Gosling et al., 2003). Art expertise was assessed through four items derived from the Vienna Art Interest and Art Knowledge Questions (Specker et al., 2020) on art education or training, art interest, and art related behavior. We also asked if participants had ever visited any online art presentation previously in their lives.

Pre-/Post-viewing Survey—Wellbeing, Anxiety, Mood, Loneliness

To measure the impact of visiting the online material, we assessed six dependent variables (hereafter "Wellbeing DVs"). These were presented in random order in both the pre- and post-viewing survey to assess change after the brief online engagement; (1) The De Jong Gierveld 6-Item Loneliness Scale (De Jong Gierveld and Van Tilburg, 2010); (2) State-Trait Anxiety Inventory (Marteau and Bekker, 1992); (3) The Satisfaction with Life scale (Diener et al., 1985); (4) The Subjective Wellbeing scale (Tinkler and Hicks, 2011); (5–6) Mood was assessed by two questions asking participants to rate their overall positive and negative mood. Note, all Likert-type scale-based questions here and in the post-study were adapted to seven points to aid consistency of answering.

Online Experience Evaluations

In the post-viewing questionnaire, participants also appraised the stimuli via four questions on a 7-point scale (1 = 'not at all,' 7 = 'very much'), indicating how beautiful, meaningful, and good the stimuli were, and how much they would like to visit the website again. Participants were also asked if they felt they had seen 'art' during the experience or not (binary forced-choice: "I saw art"/"I saw something else").

As an exploratory means of collecting more information on the nature of the experience, participants were presented with a list of 55 cognitive-emotional terms (e.g., "serenity," "bored," "angry," and "harmonious," etc.), and asked to express how much they felt each of them while they were viewing the stimulus (1 = 'not at all,' 7 = 'very much'). See **Supplementary Table 2** for full list. Previously, variations of this list have been used to further examine types of art experiences (Pelowski, 2015; Pelowski et al., 2018, 2019).

RESULTS

Participants were included in the final sample if they had completed more than 65% of the total survey, allowing at least one pairwise comparison, and if they had spent at least 10 s viewing the online materials. This cut off was selected based on the mode viewing time reported in a classic study of art viewing by Smith et al. (2016) which was 10 s, also consistent with other studies (see for review Smith and Smith, 2001; Pelowski et al., 2017c; Verhavert et al., 2018). Forty participants were excluded due to insufficient survey completion; 19 were excluded due to overly short viewing times. A histogram of the time spent viewing can be found in the **Supplementary Figure 1**.

Supplementary Table 1 provides the demographic and art interest descriptive statistics across the final sample of participants divided between conditions, as well as between-conditions statistical comparisons. A comparison of individual's average art interest, typical art engagement, and art training found no significant differences between groups (**Supplementary Table 1**). In addition, there were no significant differences in days spent in lockdown (M = 50.6), age, or personality.

Here, and throughout the results section, we employed a mix of parametric and equivalent non-parametric analyses on a case-by-case basis, depending on violation of assumptions. These are indicated where applicable.

Descriptive Results of Viewing Time, Appraisal and Experience of Online Engagements

Mean results of reported appraisal and cognitive-emotional terms are shown in **Figure 2** (see also **Supplementary Table 2** for descriptive statistics). Comparison between conditions for whether individuals believed they had seen a work of "art" versus "something else" revealed, as expected, a significant difference [χ^2 (1,84) = 5.25,

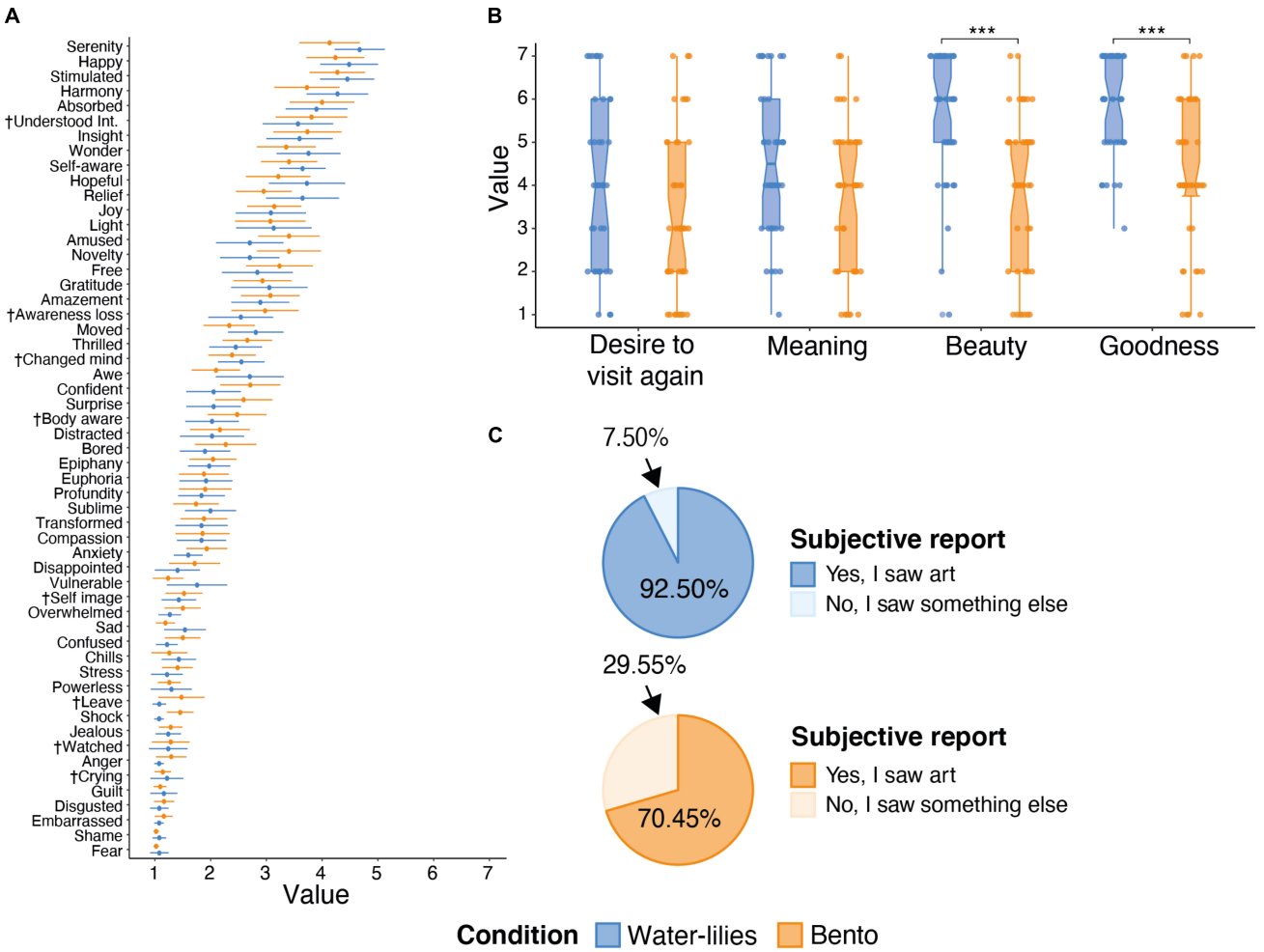

FIGURE 2 | (A) Shows means and 95% CI intervals for participants ratings of cognitive-emotional states during the online cultural engagements for the Water-lilies (light blue) and Bento (light orange) conditions.† shorthand labels, see **Supplementary Material** for the complete labels. **(B)** Box plots showing the ratings for aesthetic evaluation for the Water-lilies and Bento conditions, showing that in general Water-lilies condition was rated more highly. **(C)** Pie chart showing percentages of participants who reported to see art or something else while engaging online with the Water-lilies and Bento conditions.

p = 0.02], with 92% of individuals in the Water-lilies condition agreeing they saw art, compared to 70% in the Bento condition (this, a still rather high result, is also considered further below).

Participants in both conditions, on average, evaluated their online engagements positively, with Wilcoxon rank-sum tests conducted for each variable independently revealing comparatively higher beautifulness and goodness appraisals in the Water-lilies condition (Z = −4.18, p < 0.001, and Z = −4.56, p > 0.001), whereas meaningful and desire to visit again did not show differences (Z = −1.81, p = 0.279 and Z = −2.06, p = 0.157, respectively; p-values adjusted with a Bonferroni correction for multiple comparisons; Non-parametric tests employed due to violation of normality of appraisals' distributions, see **Supplementary Figure 4**). The four appraisals themselves also showed positive intercorrelation (r_s = 0.55–0.71) across conditions.

On average, participants engaged with the online content for around one-and-a-half to two minutes (Water-lilies: M = 107 s, SD = 69 s, range = 11–274 s; Bento: M = 209 s, SD = 249 s, range = 10–1401 s). A Wilcoxon rank-sum test comparing conditions was not significant (Z = −1.76, p = 0.08). Across conditions, viewing time was also not correlated with the four appraisals of the material themselves (all r_s = 0.04–0.1, scatterplots of relationship between time spend and each DV per condition can be found in **Supplementary Figure 3**).

When asked how they felt while engaging the online content, participants indicated quite similar positive-valence emotions and cognitive states (e.g., serenity, happy, stimulated, insight), with low levels of negative emotions (fear, embarrassed, anger, etc.), in both conditions (see **Figure 2** for comparisons at the individual item level).

TABLE 1 | Average participant self-report ratings for each time condition per group (means and standard deviations).

Variable		Water-lilies[a]				Bento[b]			
		Pre		Post		Pre		Post	
Negative mood	*M* (*SD*)	3.08	(1.32)	2.75	(1.36)	2.95	(1.53)	2.64	(1.60)
Positive mood	*M* (*SD*)	4.31	(1.39)	4.75	(1.18)	4.69	(1.24)	4.86	(1.34)
Anxiety	*M* (*SD*)	3.60	(1.18)	3.19	(1.16)	3.31	(1.32)	3.09	(1.24)
Loneliness	*M* (*SD*)	3.49	(1.10)	3.32	(0.93)	3.50	(0.93)	3.34	(0.97)
Life satisfaction	*M* (*SD*)	4.54	(1.28)	4.95	(1.30)	4.52	(1.21)	4.41	(1.40)
Wellbeing	*M* (*SD*)	4.26	(1.12)	4.49	(1.11)	4.41	(1.14)	4.66	(1.14)

N^a = 36, N^b = 42, (see exclusion criteria). For a positive impact to occur, negative mood, anxiety, and loneliness should decrease whereas positive mood, satisfaction with life and wellbeing should increase.

What Is the Impact of Art and Non-art Online Engagements on Wellbeing and How Do They Compare?

Descriptive statistics for the Wellbeing DVs, pre- and post-viewing, are provided in **Table 1** and visualized as violin plots with individual slopes for each participant, in **Figure 3**. Effect sizes for each condition and the total sample are shown in **Figure 3**. Correlations between Wellbeing DVs (pre-, post-, and post-pre changes) are shown in **Supplementary Figure 2**.

As can be seen, in general, participants showed mean baseline scores (before viewing) at just below the midpoints for most DV scales, albeit with a rather large spread across participants. We also found a general moderate correlation between most baseline Wellbeing DVs (**Supplementary Figure 2**). No differences in baseline scores were found, for all Wellbeing DVs, when comparing between condition groups (**Supplementary Table 1**).

In general (**Figure 3**) the Wellbeing DVs, when considered after the online engagements, tended to show mean changes in the expected directions (i.e., decreased state-anxiety, loneliness, negative mood; increased positive mood and wellbeing), with the Water-lilies conditions tending to have generally larger effect sizes.

To statistically test the results, we first conducted a two-way mixed repeated measures multivariate analysis of variance (MANOVA) on the six Wellbeing DVs, with *Time* (pre, post; within-subjects) and engagement *Condition* (Water-lilies, Bento; between-subjects) as independent variables (conducted in Rstudio, R version 3.6.2; RStudio Team, 2019). In MANOVA, group differences are tested by creating a linear combination of the Wellbeing DVs that maximize group differences, and is considered to be optimal when Wellbeing DVs show correlation (Tabachnick and Fidell, 2013). This was conducted on a reduced sample of 78 participants (36 Water-lilies, 42 Bento) due to three participants having missing data and the detection of three multivariate outliers (2 Bento, 1 Water-lilies) with Mahalanobis distance exceeding the critical value (22.46; df = 6, MD1 = 23.35, MD2 = 24.52, MD3 = 24.81). Analyses including the outliers did not substantially differ, however, it impacted the marginal significance of a covariate in one of the *post hoc* analysis (see **Table 2**). The Wellbeing DVs were not multivariate normally distributed, however, MANOVA has been shown to be robust to violations of the assumption of multivariate normality when the sample is, as in our case, >30 per condition (Tabachnick and Fidell, 2013). The data met assumptions for homogeneity of variance (all Levene's tests $p > 0.05$) and multicollinearity for Wellbeing DVs (correlations between Wellbeing DVs were < 0.8).

The analysis showed a main effect of *Time* {$F(6,71) = 3.65$, $p = 0.003$; $\eta_p^2 = 0.24$, 90% CI = [0.05; 0.31]} across both conditions. However, neither the main effect of *Condition* [$F(6,71) = 0.56$, $p = 0.763$] nor the *Condition* × *Time* interaction [$F(6,71) = 0.64$, $p = 0.700$] significantly affected the linear combination of Wellbeing DVs. These results suggested that both types of online cultural engagement significantly impacted the combined Wellbeing DVs; however, there was not a significant difference between the impact of the Water-lilies and Bento conditions ($\eta_p^2 = 0.05$, 90% CI = [0; 0.07]). An additional series of repeated measures ANOVAs, run independently for each of the Wellbeing DVs and looking at potential differences between conditions, showed all interactions with *Time* not to be significant, with p-values ranging from $p = 0.171$ to $p = 0.971$ (all p-values uncorrected, see **Supplementary Table 3**).

What Is the Impact of Online Engagement on Individual Wellbeing DVs?

To further consider the impact of the online interventions on the specific Wellbeing DVs which were assessed above, as well as their potential interrelation, we carried out a Roy-Bargman stepdown analysis. This approach is suggested as a best-practice follow up for MANOVA (Tabachnick and Fidell, 2013), especially in cases of correlation between Wellbeing DVs as noted above. This procedure consisted of, first, univariate post-hoc ANOVAs on each individual DV, in order to examine main effects of time at the individual DV level.

This was followed by a set of ANCOVAs, which tested for the effects of *Time* on each of the Wellbeing DVs, taking into account other Wellbeing DVs as covariates in a prioritized, step-down order. This second step allowed us to control for effects that are shared between the Wellbeing DVs, a phenomenon found in past studies looking at factors of wellbeing (i.e., Dua, 1993; Cohen et al., 2017). As a consequence of the above findings of a significant impact of the online

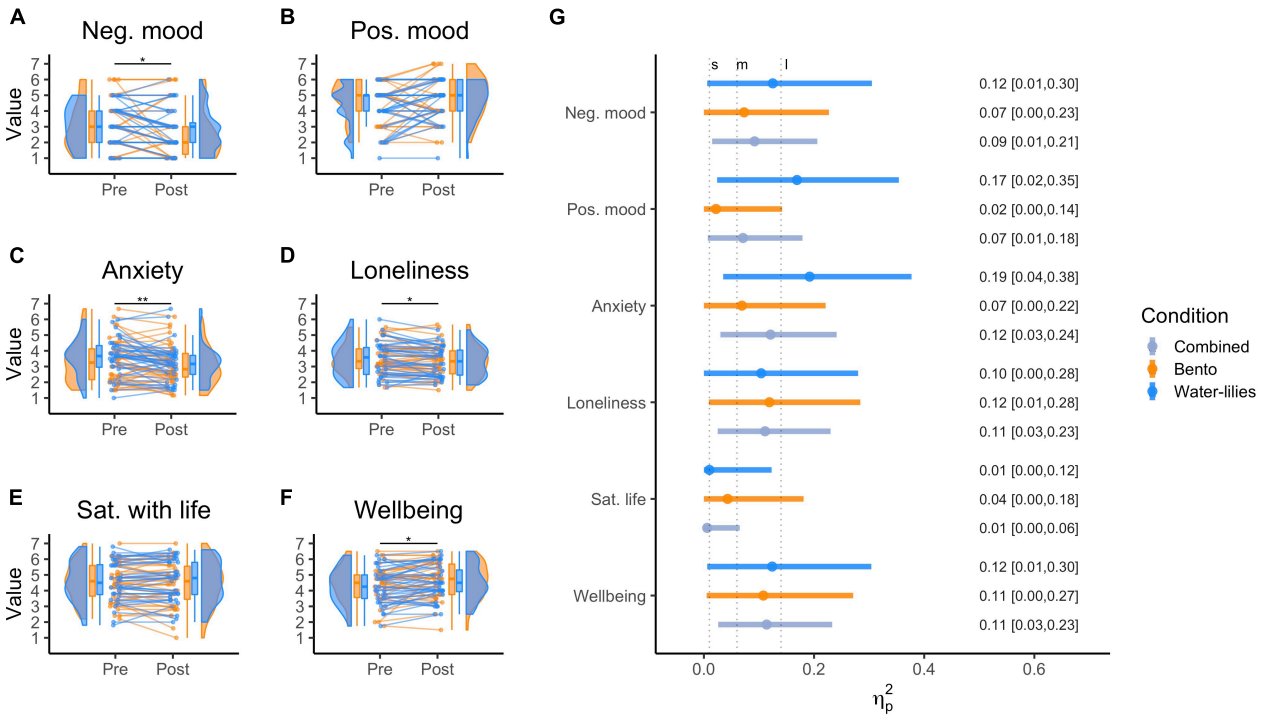

FIGURE 3 | (A–F) Raincloud plots showing the distributions of rating pre and post online cultural experience grouped by condition. The boxplots display the median (horizontal line middle of box), the data within the 25th and the 75th percentile (inside box), and the data within the 10th to the 25th and the 75th to the 90th percentile (vertical line); Dots represent individual ratings; Slopes represent changes between pre and post. Images were computed following Langen's tutorial (Allen et al., 2021; see https://github.com/jorvlan/raincloudplots); **(G)** forest plot of the effect sizes (partial eta square) of the online experience on the six DVs. Vertical dashed lines are used to indicate intervals to interpret the strength of the effect. S, M, L indicate small, medium, and large effect size intervals.

engagements across both conditions with a non-significant difference between them, the samples were combined for these two subsequent analyses. All independent *p*-values for each of the main effects in the following tests were corrected for the number of comparisons (N = 6, *p*-values for covariates were not corrected).

At the univariate level, the results, reported in **Table 2** (see also **Figure 3** for effect sizes), indicated that the online cultural engagements had a significant impact on four of the Wellbeing DVs—*negative mood, state-anxiety, subjective wellbeing*, and *loneliness*—but not on positive mood or satisfaction with life.

For the stepdown analysis, the effects of the online engagement on the Wellbeing DVs were prioritized as follows: (1) effect on mood (negative and positive); (2) effect on negative variables (state-anxiety and loneliness), after having controlled for the effect of mood; and (3) the effect on positive wellbeing variables (satisfaction with life and subjective wellbeing) after accounting for changes in mood and negative variables. This order was selected because, as noted in the introduction, changes in mood and state-anxiety are argued to be potentially more variable as a result of changes in one's immediate environment, which can possible contribute to changes in more complex cognitive states (Fredrickson and Branigan, 2005). Homogeneities of the regression slopes were obtained for all of the subsequent univariate analyses.

The results suggested that changes observed in state-anxiety and wellbeing were not uniquely impacted by the online cultural engagements beyond the shared effect on mood. For loneliness, although significantly impacted by the online engagements, the effect was accounted for by changes in state-anxiety, after controlling for the effect of changes in mood.

Exploratory Analyses

We then turned to a *post hoc* exploratory analysis, considering some of the other research questions noted in this study, as well as some of the above-reported findings.

Do Appraisals of the Experience Relate to Impacts on Wellbeing?

First, as a general consideration of the relation between the nature of experience and its impact, we considered the correlation between appraisals of the online material (meaning, beauty, goodness, desire to visit again) and the change scores (post-pre) for the individual Wellbeing DVs. We similarly considered viewing time. Due to the violations of normality, we used Spearman's Rank correlations. Results for combined online conditions are shown in **Figure 4**. Results split between conditions can be found in **Supplementary Table 4**.

Decreases especially in negative mood, as well as state-anxiety and positive mood, were significantly related to relatively higher appraisals. Changes in negative mood were

TABLE 2 | Stepdown analysis statistics.

Variable	Analysis	Covariate	*Pre*	*Post*	*df*	*F*	*p(adj)*	η_p^2	90% CI	
			M (*SD*)	*M* (*SD*)					LL	UL
Negative mood	Univariate	–	3.01 (1.43)	2.69 (1.49)	1, 77	7.81	**0.039**	0.09	0.15	0.21
Positive mood	Univariate	–	4.51 (1.32)	4.81 (1.26)	1, 77	5.92	0.104	0.07	0.00	0.18
	Step-down	Negative mood			1, 76	49.72	**<0.001**	0.40	0.25	0.51
	Step-down				1, 76	0.83	0.353	0.01	0.00	0.08
Anxiety	Univariate	–	3.44 (1.26)	3.14 (1.20)	1, 77	5.92	**0.001**	0.12	0.03	0.24
	Step-down	Negative mood			1, 75	29.71	**<0.001**	0.28	0.15	0.41
	Step-down	Positive mood			1, 75	13.72	**<0.001**	0.15	0.05	0.28
	Step-down				1, 75	3.68	0.406	0.05	0.00	0.15
Loneliness	Univariate	–	3.50 (1.00)	3.33 (0.95)	1, 77	9.64	**0.016**	0.11	0.03	0.23
	Step-down	Negative mood[a]			1, 74	3.47	0.067	0.06	0.00	0.16
	Step-down	Positive mood			1, 74	1.26	0.265	0.02	0.00	0.09
	Step-down	Anxiety			1, 74	6.14	**0.016**	0.08	0.00	0.18
	Step-down				1, 74	4.54	0.219	0.05	0.00	0.14
Life satisfaction	Univariate	–	4.53 (1.24)	4.50 (1.35)	1, 77	0.00	>0.999	0.01	0.00	0.01
	Step-down	Negative mood			1, 73	0.01	0.932	0.01	0.00	0.07
	Step-down	Positive mood			1, 73	0.18	0.281	0.01	0.00	0.09
	Step-down	Anxiety			1, 73	0.14	0.705	0.00	0.00	0.01
	Step-down	Loneliness			1, 73	0.13	0.721	0.00	0.00	0.05
	Step-down				1, 73	0.53	0.353	0.00	0.00	0.05
Well-being	Univariate	–	4.34 (1.12)	4.58 (1.12)	1, 77	9.90	**0.014**	0.11	0.03	0.23
	Step-down	Negative mood			1, 72	6.19	**0.015**	0.08	0.01	0.19
	Step-down	Positive mood			1, 72	4.57	**0.036**	0.06	0.00	1.16
	Step-down	Anxiety			1, 72	1.31	0.256	0.00	0.00	0.06
	Step-down	Loneliness			1, 72	3.26	0.075	0.04	0.00	0.15
	Step-down	Life satisfaction			1, 72	0.30	0.588	0.02	0.00	0.10
	Step-down				1, 72	3.44	0.353	0.04	0.00	0.14

CI, confidence interval; LL, lower limit; UL, upper limit. The bolded values indicate statistically significant values.
[a]*Before exclusion of three multivariate outliers, negative mood explained a significant proportion of the change in loneliness, p = 0.032.*

related to reported desire to visit the experience again, meaningfulness, beauty, and marginally related to goodness. Similarly, changes in state-anxiety and positive mood were significantly related to desire to visit again, goodness, with state-anxiety also marginally related to beauty. Goodness alone also was correlated with lower loneliness. Note, however, that, only the relationships between meaningfulness and changes in negative mood and goodness and changes in loneliness remained significant or marginally significant (after multiple comparisons testing) (adjusted $p_s = 0.049$ and 0.067, respectively; Bonferroni correction for 24 tests). Amount of time spent by individuals was not significantly related with any DV change ($r_s = -0.21$–0.19).

Does Seeing "Art" Influence Impact on Wellbeing?

We then followed up on participants' classification of the stimuli as "art," considering the large number of individuals that considered even the Bento condition to be an artwork. A breakdown between participants who said they saw either "art" or "something else," regardless of their actual Waterlilies/Bento assignment, comparing appraisals of beauty, goodness, meaningfulness, and desire to visit again are shown in **Supplementary Table 5**. A breakdown of DV change scores for "I saw art" and "something else" is shown in **Supplementary Table 6**. Difference in appraisals and Wellbeing DVs are shown in **Figure 4**. To consider these distinctions, we used multivariate analysis with groups, "I saw art" group ($N = 63$) or "I did not see art" ($N = 15$). Wilcoxon rank sum test suggested that participants who indicated that they saw "art," regardless of assigned condition, reported significantly higher meaningfulness ($Z = -2.29$, $p = 0.022$), beauty ($Z = -3.72$, $p < 0.001$), and goodness ($Z = -3.99$, $p < 0.001$), and marginally significant higher desire to visit again ($Z = -1.91$, $p = 0.055$).

However, a series of two-sample nonparametric Welch's *t*-tests, comparing change scores between conditions, did not reveal significant differences between those who reported seeing "art" or "something else" for any DV (all *p*-values > 0.26).

Do Cognitive-Emotional Experience Factors Predict Impact on Wellbeing?

Finally, we returned to the list of the cognitive-emotional items that participants reported feeling during their experiences. To reduce the data and to identify potential patterns, we conducted a Principal Component Analysis (PCA) on all 55 items. A parallel analysis using Monte Carlo simulation with permutations (5000) of the raw data set, conducted in SPSS with the rawpar.sps script

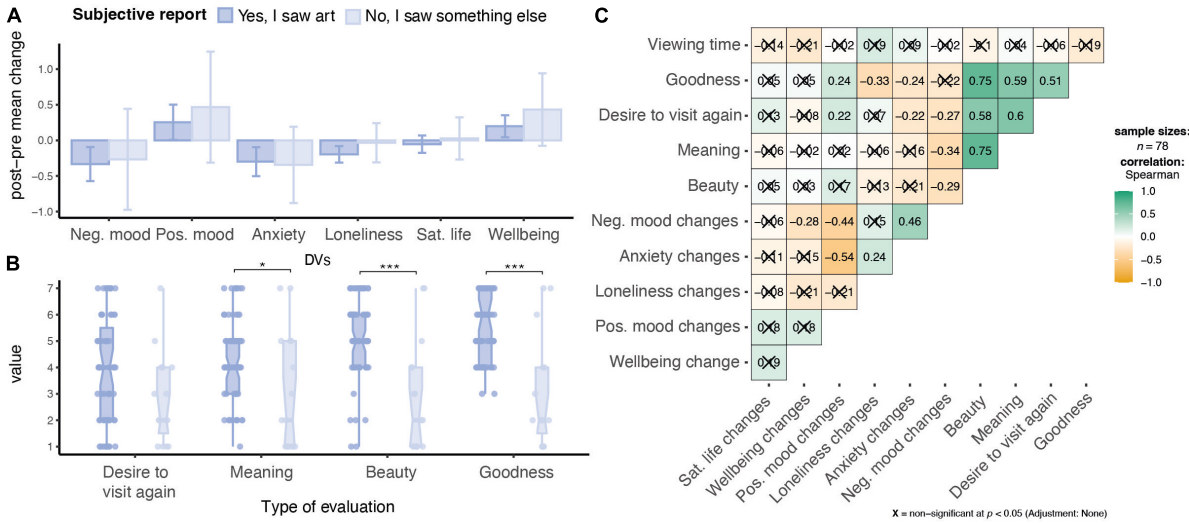

FIGURE 4 | Subjective experience of participants, including **(A)** DV changes grouped by perception of if participants considered they say art or not, bar plots showing the breakdown of changes in Wellbeing DVs. Error bars represent 95% CI. **(B)** Box plots showing the breakdown of the aesthetic ratings grouped by subjective reports (i.e., seeing art), Error bars represent SD. $^{*}p < 0.05$, $^{***}p < 0.001$. *p*-values uncorrected. **(B)** Appraisals shown broken down by I saw art or not. **(C)** Correlations between viewing time, appraisals and changes in Wellbeing DVs. Correlation plot was computed using ggstatplot (Patil, 2021).

(O'Connor, 2000), suggested four significant components. These were then assessed using a Direct Oblimen rotation, which allows for an orthogonal or oblique solution, expected to provide a more natural fit for the data. The Kaiser–Meyer–Olkin measure verified sampling adequacy (KMO = 0.65; Field, 2009). Bartlett's test of sphericity $X^2 = 3359.9$, $p < 0.001$, also indicated sufficient correlations between items to support the PCA analysis.

The resulting rotated components solution (**Supplementary Table 7**) accounted for 48.48% of the variance, with a breakdown of items more or less in line with past findings (Pelowski, 2015; Pelowski et al., 2019). The first component (26.20% of variance) largely consisting of items related to positive or socially focused terms (highest loadings: confident, changed self-image, compassion, gratitude, free, sublime, etc.). The second component (11.11%) described largely negative and again socially focused terms (fear, like crying, sad, powerless, stress, shame, guilt, vulnerable). The third component (5.91%) included items previously suggested to indicate largely "facile" (Pelowski, 2015) or unrewarding experience (disappointed, bored, need to leave, embarrassed, and confused). The fourth component (5.30%) described more insightful or transformative aspects (absorbed, thrilled, insight, change mind, epiphany, etc.).

Component scores were then calculated per component for each participant (*via* regression method). These scores were then used in a series of multiple regressions to predict change in the Wellbeing DVs. See **Supplementary Tables 8–10** for all results both considering combined or split between conditions. Once again, changes in especially negative mood emerged as being significantly predicted by the combined model [$F(4,69) = 6.29$, $p < 0.001$, $R^2 = 0.27$]. Further analysis revealed that such changes were significantly driven by Component 1 ("*positive/social affect*"; $t = -2.15$, $p = 0.035$), with higher scores relating to a decrease in negative mood, and to lower scores of Component 3 ("*facile*"; $t = 3.75$, $p > 0.001$).

Decreasing state-anxiety was also significantly predicted, again, by component one [$t = -2.39$, $p = 0.020$; main model ($F(4,69) = 2.285$, $p = 0.069$, $R^2 = 0.12$]. No other Wellbeing DVs were significantly predicted by any of the components (*p*-values are uncorrected). Interestingly, as with the appraisals above, the relationships between the cognitive-emotional components and Wellbeing DVs also tended to emerge more saliently in the Water-lilies condition, whereas with the Bento condition no significant state-anxiety or mood-related effects were found.

DISCUSSION

We found a significant impact on several wellbeing variables in a pre-/post-paradigm in which individuals were asked to briefly visit an online art exhibition (one Monet painting) or another similarly-formatted, "non-art" cultural engagement (a display of Japanese culinary tradition, aligning more to what might be encountered in a history museum offline). This included lowered state-anxiety, negative mood, loneliness, and increased subjective wellbeing. This occurred, in the art condition, with an interactive display of one painting, and in the other display of cultural material, and in both cases, over durations averaging one-and-a-half to two minutes, notably with no significant relationship between positive impact and actual time spent engaging.

A stepdown analysis found that the changes in Wellbeing dependent variables (Wellbeing DVs) tended to be explained by changes in negative mood (in the case of positive mood, state-anxiety and wellbeing), while improved loneliness was explained by improvements in state-anxiety. Finally, the "art" condition had generally larger effect sizes, but was not significantly '*better*' than

"non-art" at improving any Wellbeing DV. When considering the nature and appraisals of the experience, a significant relationship was found between decreases in negative mood, and to a lesser extent state-anxiety and positive mood, and positive appraisals of the experience (desire to visit again, beauty, and, most pronounced, meaningfulness). Similarly, changes in negative mood and state-anxiety related to higher reported positive or socially focused cognitive-emotional states (Component 1).

General Efficacy for Online Art and Cultural Interventions

These results raise several implications for both pragmatic and theoretical application of the arts for wellbeing. First, this provides initial evidence that such wellbeing effects can be found via brief interactions with art and similar cultural materials online, impacting many of the same variables as considered in in-person studies. This finding, detected with an adult sample of convenience, during a unique COVID-19-induced lockdown period, might be viewed as proof of concept that technology, via the internet, can deliver targeted doses of art and culture into the everyday lives of individuals. The findings also contribute evidence to the potential of digital reproductions to produce similar effects to those found with real artworks installed in common spaces or seen in-museum visits.

The reduction of reported loneliness also merits specific mention. While probably only tangentially connected to the art experience—via the changes in anxiety—a claim could be made that the loneliness-reducing aspects of cultural engagements, routinely found in-person (Todd et al., 2017; Tymoszuk et al., 2019), might come about from the social connection or collaborative nature of visiting a museum or sharing art experiences. Here, however, we found that even visiting an exhibit, likely by oneself via the internet, led to significant effects. This is possibly due to the communal nature of visiting a public website and seeing another person's art or design. In support of such a communal claim, loneliness was one of the only variables that showed slightly larger effects in the Bento condition, which focused on human activities in a more explicit way. This adds credence to recent initiatives, especially arising during COVID-19, for online arts and culture exhibitions to target loneliness during isolation from others—another compelling target for future research.

In both conditions we found lack of significant effects on positive mood and satisfaction with life. When considering satisfaction with life, this is likely due to the more global wellbeing nature of the construct, in that the questions are asking about a more overall assessment of one's satisfaction, which is possibly not likely to change on short timescales. It would be interesting, however, to include more testing timepoints to address this in future study as satisfaction with life has been noted to be related to cultural engagement like visiting art museums (Lee et al., 2020). In regard to positive mood, it was slightly surprising to find a non-significant effect but at the same time to find a significant effect in the reduction of negative mood. It seems that both art and cultural engagement may be specifically better targeted at decreasing negative feelings while not as effective at increasing positive ones. Here it could be seen that visiting an online art and cultural website, like Google Arts and Culture, may help decrease feelings like sadness, anxiety or agitation but may not increase feelings of happiness, warmth, satisfaction. It would be especially valuable for future research to include a measurement of mood that has a variety of feeling items that can help to disentangle this further.

When comparing the effect of online art interventions to past literature, our findings are similar. Looking to the two most salient effects found in this paper—improvement in mood and state-anxiety—we found moderate to large effects in the art condition (negative mood $\eta_p^2 = 0.12$, positive mood $\eta_p^2 = 0.17$, and state-anxiety $\eta_p^2 = 0.19$). These are in line, for example with Ho et al. (2015) who reported a pre/post change (assessed via Brief Mood Introspection Scale) following an art exhibition visit in a hospital. As well as Paddon et al. (2014), who reported medium effect sizes in negative mood (Cohen's $d = 0.38$) and positive mood ($d = 0.69$), assessed via Positive and Negative Affect Schedule (PANAS), following a cultural museum object-handling session in a hospital [also see Clow and Fredhoi's (2006) report of reduction in self-reported stress after individuals spent a lunch break in-person in a museum of art].

Even comparing to other domains, our results remain roughly equivalent. For example, Cracknell et al. (2016) reported a change in affective valence (assessed via 11-point bipolar Feeling Scale), following a roughly 5-min intervention in which participants observed an aquarium fish tank, $\eta_p^2 = 0.47$ (negative-to-positive). Comparing across interactions with nature, which have been routinely shown to provide impacts on mood, a meta-analysis (McMahan and Estes, 2015) of both lab or in-person interventions reported a standardized reduction in negative affect across studies of $r = 0.12$ (increase in positive affect $r = 0.31$). In emerging results of other online interventions, Howells et al. (2015) report a smartphone-based mindfulness intervention impact on affect (measured via PANAS after 10 days of use) of medium size effect ($\eta^2 = 0.071$) for positive affect and small effect ($\eta^2 = 0.010$) for negative mood. Keeping in mind the self-report method of the present study, differences in assessment scales, and leaving open the question of the duration of impact or whether self-report might relate to physical or behavioral differences, our results provide compelling evidence for art and culture in online spaces.

Is There Anything Different About Engaging Art Versus Other Cultural Content?

In regards to our second research question, we found mixed, albeit still compelling, suggestions about the potential role that "art" might play in improving wellbeing. We did not find a significant difference between conditions. One probable explanation for the lack of difference is that both conditions, which were selected to be formally similar, evoked similar responses—for example, a generally positive interaction with visually pleasing material. Note, while the artwork was rated as more beautiful and good, both conditions were equally meaningful and evoked a desire to experience them again.

One telling result in line with the above argument was that, despite explicitly not labeling it as such on our part, we found almost 70% of those in the Bento condition actually believed that they had engaged with "art." This finding that individuals would label something—even if not intended to be seen as art in a classic sense—as an "art" example, is in line with past research. For example, Pelowski et al. (2017b) reported this with photographs of a number of random every-day objects, suggesting that individuals may use "art" as a general label of particularly appreciated visual stimuli. Thus, it is reasonable to assume that we were not in fact comparing apples to oranges as we had designed, but more likely that we were comparing apples to a different variety of apples. Indeed, it is also worth noting that culinary traditions are also seen as a form of art, possibly also contributing to these results.

The fact that participants reported higher appraisals in the case of the artworks suggests that this design indeed did elicit slightly more positive responses. On the one hand, it is important to note that, the *subjective* "art"/"not-art" label provided by the participants for their interventions (regardless of the actual assigned condition), did not result in significant differences between the impact of the cultural engagement at the level of our Wellbeing DVs, regardless of the higher appraisals. Thus, our conclusion and overall interpretation is that the label of art alone does not appear to be a necessarily important factor of cultural interventions but rather the subjective experience that the individual has with the content is much more important. This being said, these interpretation rest upon the design of the study with the inclusion of stimuli that were chosen to be similar. It would be important to further any claim based on the label of art or non-art with stimuli that are more distinct, or possibly to use a top–down manipulation of art context (see Kirk et al., 2009). We encourage further research to address participants' subjective experience in both arts and cultural interventions rather than assuming that art by way of 'aura' is necessarily better.

Potential Mechanisms for the Modulation of Mood, Anxiety, and Wellbeing

Our study also sheds light on possible potential underlying mechanisms for how art and culture can lead to wellbeing impacts. Our stepdown analysis highlighted that online cultural engagement might especially be an avenue to regulating mood, which possibly drives other positive impacts (state-anxiety, subjective wellbeing). This highlight of mood regulation is supported by past research, which has found emotion and mood regulation as a common beneficial outcome of a variety of types of arts and cultural engagement (Ivcevic and Brackett, 2015; Fancourt et al., 2019, 2021).

The significant relationships between the impacts on mood and individuals' appraisals and cognitive-emotional experience adds new data to our understanding of how art interventions might work. The finding that higher positive cognitive-emotional states (e.g., joy, and social terms such as confident, compassion, gratitude) and more profound states such as free, moved, awe, sublime, raise interesting implications for past arguments that contributors to wellbeing impacts beyond mere pleasure. For example, many of these terms could be argued to overlap with Kaplan's (1995) discussion of "fascination" as a pillar of restorative effects from viewing nature. Empirical evidence for such nuanced aspects in art engagement is only recently emerging (Pelowski et al., 2017c). However, it seems plausible that encouraging specific types of cognitive-emotional states, perhaps through choice of content, is an important consideration when designing interventions and is another target for further research.

Several of these states (awe, moved) are also suggested to be prototypical emotions in aesthetic experience (Fingerhut and Prinz, 2020). Along with our findings of the relationship of beauty, meaningfulness, and other positive appraisals to individual's change in mood, one could make a claim that the present results support arguments highlighting aesthetic experiences as an important factor in art interventions (Sachs et al., 2015; Fancourt and Finn, 2019; Mastandrea et al., 2019). Fancourt and Finn (2019), include aesthetic experience in their summary of the mechanisms underlying the impact of art engagement on health and wellbeing while Mastandrea et al. (2019) further note that aesthetic experiences from visual art can induce highly pleasurable states and these states can impact affect and aid mood regulation. In future research, these features of art and cultural interventions need to be further teased apart so that we may understand what types of experiences, and which aspects of those experiences can impact which types of individuals.

Duration and Dosage

Another interesting finding of the study involves the required time and amount of art. Unlike previous studies that have typically either installed some works of art or asked individuals to have a complete museum experience, in the present study we found improvement in wellbeing variables even with an interactive exhibition of one painting in under 5 min. This viewing duration aligns with typical ranges of individual artwork engagement in museums (Pelowski et al., 2017a). The results are also in line with other wellbeing findings. For example, the Cracknell et al. (2016) study of aquarium-viewing found that peak impacts on mood tended to be delivered within the first 5 min. Our results provide a suggestion for the possibility of "micro-dosing" art and culture that might fit into everyday routines, delivered online.

Caveats and Targets for Future Research

This study is, of course, not without its limitations. It should, we would argue, be treated as a first exploratory step, with its findings viewed primarily as calls for future research. Readers should also take our results and interpretations with our sample size in mind. Although we found that, indeed, there is a measurable, systematic effect on a variety of variables related to wellbeing as they are self-reported by participants, it is important to consider several factors that could be raised about this result. First, in regard to the intervention itself, we had little control over what type of device was used (computer or phone), in which setting (home, office, while commuting, in hospital), and how intently participants engaged with the chosen stimuli. Similarly, in line with the nature of this type of ecological online experiment we were unable to

supervise participants to see if they viewed the stimuli with a desirable amount of concentration.

We recommend that future study should therefore not only test for replication, but also include more rigorous and more controlled paradigm (e.g., using a webcam to monitor engagement, recording screen and mouse movement, etc.). That said, it could also be argued that the experience of viewing the online exhibitions, where participants could freely engage with the stimuli in their home environments, represents a strength of this study, as it reflects findings that can be generalized to more ecologically valid scenarios. Indeed, regardless of the confounding behavior that participants might have engaged in, we still found a systematic improvement in their wellbeing, suggesting that such online engagement, not in a lab where researchers ensure no distractions, but rather in the real world, is viable and deserves further study.

It is also possible due to the pre-post nature of our design that participants' answers may have been impacted by, for example, a placebo effect or more social-driven factors such as the Hawthorne effect (Adair, 1984) in which participants might guess the study goals and respond how they feel they should (desirability effect or command bias). Although this is possible, as is the case for many psychological studies, we do not believe this precludes our results from a meaningful interpretation. Indeed, the supposed Hawthorne effect was neither consistent across all wellbeing variables (e.g., we did not find significant overall changes in positive mood or satisfaction with life) nor across all individuals (for each variable, some participants indicated that their positive mood, for example, decreased, see **Figure 4**). Further, due to the randomization of the six batteries of DV questions, it would be difficult for individuals to remember so many questions to then seek based on their figuring out the hypothesis to fake their answers. Thus, despite these noteworthy limitations, our results still suggest that online cultural intervention on specific facets of wellbeing is a viable area for more research. As a next step, we strongly encourage the addition of a control condition to strengthen the interpretability of the effect possibly through larger sample sizes based on these reported effect sizes, and the inclusion of a post only comparison group or other control groups.

Additionally, we are unable to determine the causality of the relationship between appraisals, cognitive-emotional experience, and impacts on mood and anxiety. Participants first viewed the cultural content, then indicated which cognitive-emotional states they experienced while viewing, and subsequently provided their appraisals of the exhibition, followed by their actual mental wellbeing state. We would encourage further research to examine if subjective experiences, such as beauty and meaningfulness, mediate the impact of said intervention on mood and anxiety. Or, alternately, if an improved cognitive, emotional, or physiological state influence reported appraisals. It would be interesting to compare these effects to other—perhaps less visually appealing or more information-focused—conditions, or stimuli that might not be spontaneously labeled as art but rather lacking any trace of intentionally of human connection.

CONCLUSION

In conclusion, the results of this paper suggest that online cultural engagement, including but not limited to fine art, does seem to be a viable tool to support individuals' mood, anxiety, loneliness and wellbeing especially when such content is beautiful, meaningful, and inspires positive cognitive-emotional states in the viewer.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://github.com/giacomobignardi/Trupp-online-art-wellbeing.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MT, KC, and MP contributed to the design of the study. MT and KC conducted the literature review. MT prepared the materials and collected and processed the data. MT, GB, ES, and MP contributed to the planning of the analysis. GB and MP conducted the analysis. MT and ES validated the analytical work. MT, GB, and KC drafted the manuscript. MP supervised the study. MT and MP revised the manuscript. All authors contributed to the article and approved the submitted version.

FUNDING

The writing of this article was supported by a Grant to MP from the EU Horizon 2020 TRANSFORMATIONS-17-2019, Societal Challenges and the Arts (870827 – ARTIS, Art and Research on Transformations of Individuals of Society). GB was supported by the German Federal Ministry of Education and Research (BMBF) and Max Planck Society.

ACKNOWLEDGMENTS

We would like to thank Corinna Kühnapfel, Joerg Fingerhut, and Sandra Trupp for feedback on this manuscript and the members of the Empirical Visual Aesthetics Lab for feedback on this project.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.782033/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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OPINION
published: 22 July 2022
doi: 10.3389/fpsyg.2022.949685

Arts and Health Glossary - A Summary of Definitions for Use in Research, Policy and Practice

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Keywords: art, arts, health, glossary, evidence, definition, research, policy

INTRODUCTION

Evidence-based research, reviews, policy, practice and programs, informed by the discipline of '*Arts and Health*' (also sometimes referred to as 'Arts in Health,' 'Arts for Health,' 'Arts-Health') (White, 2009), have the potential to positively contribute to the *health* and *wellbeing* of the general population and specific population groups (e.g., young people, older adults, LGBTQI+ people, refugees, people with a disability, people who are isolated, etc) (Smith, 2002; South, 2004; Staricoff, 2004; Putland, 2008; White, 2009; Fraser et al., 2015; Mapuana et al., 2015; Menzer, 2015; Clift and Camic, 2016; Davies et al., 2016; Wreford, 2016; Zarobe and Bungay, 2017; Daykin et al., 2018; A New Approach (ANA), 2019; Vella-Burrows et al., 2019; Davies and Pescud, 2020; Corbin et al., 2021). A recent systematic review of both qualitative and quantitative articles found 'strong evidence' of the impact of arts engagement on mental wellbeing, 'moderate to strong evidence' on social health and 'emerging/low evidence' related to healthy eating, physical activity, preventing tobacco use and preventing harm from alcohol (Davies and Pescud, 2020). Although the idea that the arts can impact health is not novel (e.g., paintings have been used in hospitals since the middle ages to enhance the health environment) (Clift et al., 2009), compared to other health fields, the discipline of Arts and Health is relatively new, therefore a glossary of definitions is useful to facilitate communication and to clarify terminology and concepts from which evidence-based research, reviews, policy, practice and programs can be developed. The definitions included in this opinion paper are not intended to be exhaustive and draw on a wide range of disciplines including health promotion, epidemiology, psychology, medicine and the arts. We have endeavored to keep our definitions short, and where needed, encourage the reader to seek deeper interpretations and explanations which may be found by consulting the relevant references associated with each definition. When reading this opinion piece, we encourage the reader to consider the following limitations. First, some of the concepts and definitions used in this glossary reflect the discipline of expertise, experience, cultural bias and country of the authors (i.e., Australia and the UK). Second, the definitions provided will be influenced by current language, knowledge, health, social and economic conditions. Third, the definitions provided are by their very nature summaries of complex ideas and therefore restrictive in scope. With these limitations in mind, an arts and health glossary on which to base shared language and meaning, still has the potential to facilitate understanding, co-operation and multi-discipline partnerships at a local, national and international level.

OPEN ACCESS

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Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: *21 May 2022*
Accepted: *23 June 2022*
Published: *22 July 2022*

Citation:
Davies CR and Clift S (2022) Arts and Health Glossary - A Summary of Definitions for Use in Research, Policy and Practice. Front. Psychol. 13:949685. doi: 10.3389/fpsyg.2022.949685

ARTS AND HEALTH GLOSSARY

Arts

The *Arts* is an umbrella term. Using a consultative approach, a definition of the *Arts* was developed by contacting experts in the field of the arts or arts-health from the UK, Australia, Europe, USA and Canada ($n = 280$, 44% response) (Davies et al., 2012). A person was considered to be an expert if they were a director, manager or curator of a leading arts organization, or an academic who had published a major arts/arts–health report or journal article (Davies et al., 2012). Based on expert knowledge and informed opinion, the *Arts* were defined by five main art forms and (within these art forms) a comprehensive list of activities and events which articulated the numerous ways people engaged in the arts. These five art forms are listed below and detailed in **Figure 1**: (Davies et al., 2012)

- Performing arts (e.g., active and receptive activities in the genre of music, dance, singing, drama, sound art, etc);
- Visual arts, design and craft (e.g., active and receptive activities in the genre of painting, drawing, craft, jewelery, ceramics, sculpture, fashion, textiles, etc);
- Community and cultural festivals (e.g., active and receptive activities in the genre of festivals such as Diwali festivals, community lantern festivals, Lunar New Year festivals, etc);
- Literature (e.g., active and receptive activities in the genre of storytelling, creative writing, journaling, publishing, etc), and
- Online, digital and electronic arts (e.g., active and receptive activities in the genre of animation, digital photography/film, e-arts, arts websites, arts related social media, e-galleries, etc).

It should be noted that each art form may operate independently, but may also collaborate, communicate and intersect in their arts practice with the other four art forms.

Arts Engagement

Arts engagement (also referred to as recreational arts engagement) is an umbrella term (Archibald and Kitson, 2019; Davies and Pescud, 2020) that describes the various ways individuals interact with the arts as part of their everyday life for enjoyment, entertainment, socially, as a hobby or as part of an organized program. Methods of engagement include (but are not limited to) making, creating, learning, performing, participating, attending, experiencing, listening to, and viewing art (Davies et al., 2012). Arts engagement may be undertaken individually (i.e., by yourself) or with others (e.g., friends, family, other participants). Arts engagement occurs within a variety of *settings* and on a continuum from *active engagement* to *receptive engagement* (Davies et al., 2016) for example:

- ***Active arts engagement***: includes overtly or directly making, performing or creating art (e.g., performing in a concert as a musician, singer or dancer; painting a picture, writing a poem, making a movie),
- ***Receptive arts engagement***: includes experiencing, attending, listening or viewing art (e.g., attending a concert as part of an audience or online audience, listening to music, viewing a painting in a gallery or e-gallery, reading a poem, watching a movie).

When a person plays a musical instrument, listens to music, sings, dances, paints, draws, reads a novel, writes creatively, attends a festival, gallery or takes part in an art class, program or intervention with an artist, musician, actor, dancer, singer, etc this is arts engagement. It is important to note that *arts engagement* and *art therapies* are not the same thing (e.g., music therapy, art therapy, drama therapy, dance movement therapy, etc) (American Art Therapy Association, 2017; The British Association of Dramatherapists, 2020; American Music Therapy Association, 2022; Dance Movement Therapy Association of Australasia, 2022). For example, dancing while at a festival with family and friends for fun, enjoyment and entertainment (arts engagement), is not the same as engaging in dance movement therapy in a treatment environment with a qualified therapist for remedial or diagnostic purposes.

Arts and Health

Arts and Health includes arts engagement and art therapies (Meeting of Cultural Ministers (MCM), 2013), and broadly refers to: (Davies and Pescud, 2020)

- The practice of applying *arts* initiatives in a variety of *settings* to directly promote, maintain or improve health and wellbeing outcomes (e.g., arts programs to improve the mental, social and/or physical health of participants); and/or
- The introduction of works of art (e.g., paintings, music, sculptures, etc.) into a *setting* to enhance health and wellbeing in that environment (e.g., music in waiting rooms to enhance patient mood); and/or
- The practice of applying *health or wellbeing* initiatives in arts settings, venues or events to promote, maintain or improve health outcomes (e.g., water provided for free at festivals especially if alcohol is also available; healthy food options provided by vendors during an arts event).

Arts on Prescription

Arts on prescription is a form of social prescribing (Poulos et al., 2019). Social prescribing enables health practitioners to refer patients to a range of local, non-clinical programs and services to address a range of psychosocial and socioeconomic issues (Torjesen, 2016; Chatterjee, 2018; The Royal Australian College of General Practitioners Consumers Health Forum of Australia, 2019; NHS England, 2022). Arts on prescription, involves a referral process to an experienced artist (rather than a therapist) who facilitates arts activities (e.g., painting, drama, craft, photography, dance, singing, lantern making, etc) in a group setting, to positively impact participant wellbeing (Bungay and Clift, 2010; Poulos et al., 2019). The purpose of arts on prescription is not to replace conventional medical treatment but rather to act as an adjunct or complement to promote wellbeing, creativity and social engagement (Bungay and Clift, 2010).

Art Therapies

Arts engagement and *art therapies* are not the same thing. Art therapies (e.g., music therapy, art therapy, drama therapy, dance movement therapy, etc) (American Art Therapy Association, 2017; The British Association of Dramatherapists, 2020; American Music Therapy Association, 2022; Dance Movement

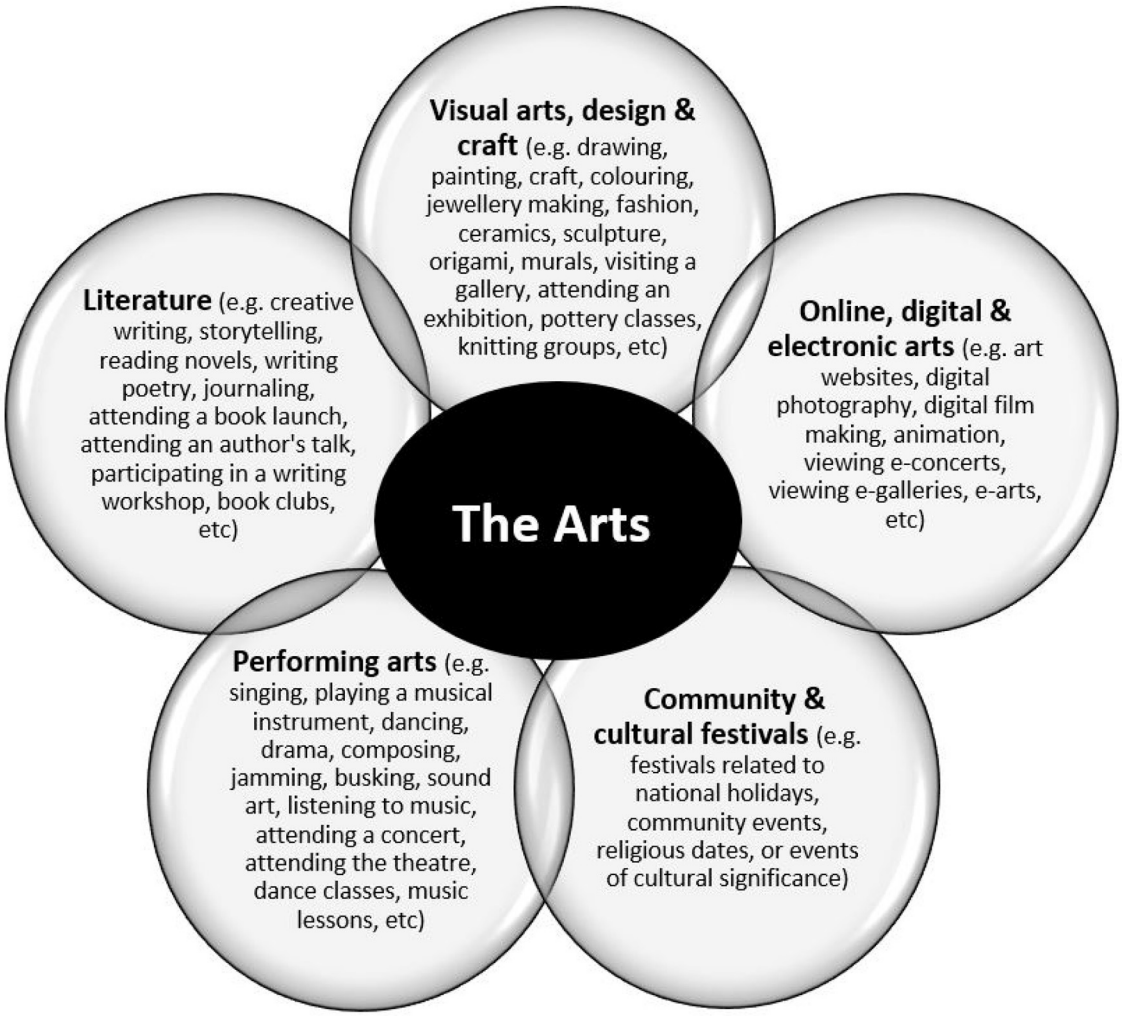

FIGURE 1 | Art forms, activities and events (adapted with permission, Davies et al., 2012).

Therapy Association of Australasia, 2022) are an "*integrated mental health and human services profession*" (American Art Therapy Association, 2017). Art therapies are a form of psychotherapy, that involve a therapeutic relationship between a qualified therapist and an individual who engage in creative activities for diagnostic or remedial purposes (American Art Therapy Association, 2017; The British Association of Dramatherapists, 2020; American Music Therapy Association, 2022; Dance Movement Therapy Association of Australasia, 2022) *Arts engagement* however, is something that people do as part of their everyday life (by themselves or with others) for enjoyment, entertainment, socially, as a hobby or as part of an organized program. When a person plays a musical instrument, listen to music, sings, dances, paints, draws, read a novel, writes creatively, attend a festival, gallery or takes part in an art class, program or intervention with an artist, musician, actor, dancer, singer, etc (rather than a therapist) this is arts engagement – not *art therapy/therapies* (Davies et al., 2016).

Evidence-Based Arts and Health

Arts and health policy, practice and organized programs should be guided by evidence-based research and evaluation (qualitative and quantitative) that is rigorous, appropriate, systematic, trustworthy and transparent, rather than methods based on anecdote and opinion (Hamilton et al., 2003; Davies et al., 2012; Daykin and Joss, 2016; Clift et al., 2021). To avoid overstating cause-effect relationships or making erroneous statements of impact, when assessing or evaluating arts and health policies, practice and programs it is useful for practitioners and researchers to consider regional context, bias, precision, relevance, appropriateness and levels of evidence (e.g., in the research hierarchy, the level of evidence provided by a case study is different to that provided by a prospective cohort study or a randomized control trial) (NHMRC, 2008; Merlin et al., 2009; Hillier et al., 2011; Munn et al., 2014). In addition, when conducting a review, it is also important to consider appropriateness. For example a scoping review is appropriate when the purpose is to identify evidence types, clarify or map

key concepts, identify knowledge gaps or act as a precursor to a systematic review; a systematic review however is appropriate when making policy, practice and funding decisions or when considering feasibility, quality, appropriateness, effectiveness or to refute/confirm current practices (Munn et al., 2018).

Health

The World Health Organization (WHO) defines *health* as "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (World Health Organization, 1946). Since it was first articulated as part of the preamble to the constituent of the WHO, this definition has been regularly contested e.g., emphasis on the word "complete" suggests a level of wellbeing that would cause the majority of society to be categorized as unhealthy (Huber, 2011). Nevertheless, the positive, holistic and aspirational view of health as embracing different forms of wellbeing continues to inform much health, public health and health promotion practice.

Health Behavior

A *health behavior* is an activity undertaken by a person, target group or population for the purpose of promoting, maintaining or improving their health and wellbeing (Nutbeam, 1998).

Outcomes

In *health*, an outcome relates to a change in the health status (positive or negative) of a person, a target group or population related to a planned or unplanned activity, event, service, program, intervention, policy, regulation or law (Nutbeam, 1998). The 'Healthy Arts Framework' (Davies et al., 2014) describes the relationship between arts engagement and both positive and negative health outcomes within the themes of mental health, social health, physical health, economic, knowledge, identity and art specific outcomes (Davies et al., 2014). The Healthy Arts Framework is guided by the biopsychosocial model of health (Engel, 1977), theories of social epidemiology (Krieger, 2001), positive psychology (Seligman and Csikszentmihalyi, 2000) and a salutogenic perspective of health (Mittelmark and Bauer, 2017). Within this framework, outcomes may be direct and deliberate (e.g., people with lung disease singing in a choir as part of their pulmonary rehabilitation), or health outcomes may be achieved unintentionally (e.g., a person attending a jewelery class to make necklaces, but the art class also increases their mental wellbeing and social interaction with others).

Settings

A setting is a place or social context in which people engage in their everyday lives (Nutbeam, 1998). Arts engagement occurs within a variety of settings, including but not limited to the home, community centers, recreation centers, parks, schools, universities, workplaces, places of worship, aged care, hospitals, prisons, museums, theaters, concert halls, art galleries, online, etc (Davies et al., 2012).

Wellbeing

Wellbeing is a multidimensional construct that broadly relates to how people experience, perceive or evaluate the quality or condition of their life (Maggino, 2015; Linton et al., 2016; Centers for Disease Control Prevention, 2018; Oman, 2021). Wellbeing is explained by a number of theories and is a complex combination of a person's physical health, social connection, cultural/spiritual connection, societal/civic engagement, economic influences (e.g., housing, work, wealth, work-life balance), knowledge/skills, sustainable development, the environment (e.g., quality, safety), emotional and mental health, and is not just about single factors such as happiness, or the absence of disease (Linton et al., 2016; Centers for Disease Control Prevention, 2018; Better Health, 2020; Jones et al., 2021; Oman, 2021; Office of the Future Generations Commissioner for Wales, 2022; Organisation for Economic Co-operation Development, 2022). Wellbeing can be both positive and negative and can be measured *via* subjective (e.g., asking people how they are feeling) or objective data (e.g., life expectancy, household income, economic growth) (Centers for Disease Control Prevention, 2018; Oman, 2021). Wellbeing is assessed in a number of ways, e.g., the OECD wellbeing indicators, (Organisation for Economic Co-operation Development, 2022) New Zealand's Wellbeing Budget, (New Zealand Government, 2022) the UK Measure of National Well-being, (Office for National Statistics, 2021) and *via* a large number of validated scales, (Linton et al., 2016) e.g., the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), (Warwick Medical School, 2021) Ryff Psychological Wellbeing Scale, (Standford University–Department of Psychology, 2022) and the WHO-5 Wellbeing Index (Topp et al., 2015).

CONCLUSION

Given the breadth of the arts and health discipline a glossary is a step toward shared understanding and meaning that can facilitate communication, policy, practice and research. As the field of arts and health grows and concepts evolve the definitions within this paper will need to be assessed and updated to ensure relevance. We hope this opinion piece will result in debate within the field and that despite the obvious restrictions of a glossary will provide a summary of key terminology, basic ideas and concepts central to the development of the arts and health discipline.

AUTHOR CONTRIBUTIONS

CD conceived the glossary and led the development. CD and SC contributed to the definitions, critical review, and final version of the glossary. All authors read and approved the final manuscript.

FUNDING

This work was supported by The Ian Potter Foundation (Ref: 31110974) and The Minderoo Foundation – Arts & Culture (Ref: 2022/GR000916). The Ian Potter Foundation and The Minderoo Foundation are two of Australia's major philanthropic foundations. This work is also supported by the Western Australian Future Health Research and Innovation Fund, which is an initiative of the Western Australian State Government (Ref: TFMH2021-CD).

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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TYPE Hypothesis and Theory
PUBLISHED 22 March 2023
DOI 10.3389/fpsyg.2023.765019

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to
Health Psychology,
a section of the journal
Frontiers in Psychology

RECEIVED 26 August 2021
ACCEPTED 23 February 2023
PUBLISHED 22 March 2023

CITATION
Vickhoff B (2023) Why art? The role of arts in arts and health. *Front. Psychol.* 14:765019. doi: 10.3389/fpsyg.2023.765019

Why art? The role of arts in arts and health

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This article is an answer to a report called "What is the evidence on the role of the arts in improving health and well-being?" The authors conclude that the arts have an impact on mental and physical health. Yet, the question of the role of the arts remains unanswered. What is and what is not an art effect? Recently, *embodied* theory has inspired articles on the perception of art. These articles have not yet received attention in the field of Arts and Health. Scholars in psychosomatic medicine have argued for an approach based on recent work in enactive embodied theory to investigate the connection between the body and the mind. The present article examines how key concepts in this theory relate to art. This leads to a discussion of art in terms of empathy—the relation between the internal state of the artist and the internal state of the beholder. I exemplify with a conceptual framework of musical empathy. Implications for health are addressed.

KEYWORDS

arts and health, aesthetic contextualism, embodied aesthetics, enactment, imagination/imagery, reuse, sensorimotor empathy, aesthetic empathy

Introduction

> *"It is difficult to say what is meant by art,*
> *and especially what is good, useful art,*
> *art for the sake of which we might condone such sacrifices*
> *as are being offered at its shrine" (Leo Tolstoy).*

In 2019, the World Health Organization for Europe published a report called "What is the evidence on the role of the arts in improving health and well-being? A scoping review" (Fancourt and Finn, 2019). The report is an evaluation of the field of *Arts and Health.* It covers, directly or indirectly, 3,000 studies. These studies demonstrate wide-ranging effects of a variety of art forms on a variety of health-related variables. Yet, the synthesis question of the *role* of the arts in Arts and Health remains to be answered. This is the main problem in the field. To present evidence of art-effects demands a definition of art. It is a matter of validity. This poses the field to the challenge to define art. Can this be done?

Discussing art definitions, the authors of the report mention cross-cultural characteristics such as value regardless of utility (as expressed in the phrase "arts for art's sake"), imaginative experiences for both the producer and the audience, emotional response, novelty, creativity, originality, specialized skills, and rules of form. The authors conclude that art is difficult to define. The reasoning results in a presentation of a list of art forms. This list comprises:

> . . . performing arts (e.g. activities in the genre of music, dance, theatre, singing and film); visual arts, design and craft (e.g. crafts, design, painting, photography, sculpture and textiles); literature (e.g. writing, reading and attending literary festivals); culture (e.g. going to museums, galleries, art exhibitions, concerts, the theatre, community events, cultural festivals and fairs); and online, digital and electronic arts (e.g. animations, film-making and computer graphics) (Fancourt and Finn, 2019, p. 1).

Few of the art forms on the list meet the cross-cultural criteria, suggested by the authors. Crafts, for example, do not have "value regardless of utility" and are not always creative or original. What is the common property on this list, which justifies the label "art"? The idea of "arts for art's sake" separates art from the beholder. This undermines the idea of Arts and Health. The fact that we, humans of any culture, devote work, time, and costs to art, contradicts that there is nothing in it for us, contradicts that art does not resonate with our lives, contradicts that art is just an object in-its-own-right. Art is not for art's sake. Art is for our sake. The question is "How?"

Studies demonstrating change in health-related variables in art interventions are often taken as evidence of an art-effect. Are they? In studies demonstrating that music is beneficial for brain plasticity (Jäncke, 2009), the effect is attributed to the rich environmental input. The same effect can be seen in mice in well-equipped cages. Are the changes an art effect or a generic effect of stimulating activity? Do studies showing that choir singing has social health benefits (Dingle et al., 2013) indicate an art effect or do they reflect the mere fact that choir singing is a collective activity? Are benefits from going to a museum an art effect or a walking effect? Are increased heart rate variability (Vickhoff et al., 2013) and benefits for breathlessness in COPD patients (Skingley et al., 2014), both caused by the deep respiration in singing, art effects? Is self-esteem following the ability to perform (Franklin, 1992), an art effect? Is the distracting effect of music during medical treatment (Moris and Linos, 2013) an art-effect? Is the cardiovascular effect from dancing (Merom et al., 2016) an art effect? If art is defined by a list of art forms, all these effects are art effects. The evident risk following from the negligence of the validity problem is that the field reports supportive evidence of art effects inevitably compromised by confounding variables. This makes the question of the role of arts legitimate. If the field cannot separate art effects from confounding variables, it cannot answer the question: Why art?

A validation of the art effect requires operational specifications based on a "nominal definition" of art. A nominal definition, as proposed by the 17th century philosopher John Locke, is "an abstract Idea to which the Name is annexed" (Newman, 2007).

Defining art is difficult for several reasons:

1. Art is disparate. Some arts are static, others time varying. Some engage hearing, others sight. Some invite participation, others contemplation.
2. Art is creative. Artists invent new expressions, which do not fit definitions. If there is a recipe, there is no creativity. If it is specified, it cannot surprise. If there is a norm (as in the Soviet Union and in Nazi Germany), it cannot be oppositional.
3. Art has a connotation of quality. A painting is not art just because it is painted. It is a matter of taste and judgment. A benchmark for what qualifies as a work of art is the consensus in the "Art World" (artists, critics and the market). This indicates what is considered art, but does not specify what art is.

Can an overarching theory of Art and Health be formulated? The studies in the WHO-report invoke theories from "psychology, psychiatry, epidemiology, philosophy, ecology, history, health economics, neuroscience, medicine, health geography, public health, anthropology, and sociology, among others" (p. 1). The need of an overarching theory has been highlighted (Koch, 2017; Stickley et al., 2017). Theoretical awareness is important for linking art to health, for research design, for validation of art effects, and for the progress and refinement of art-therapy. In the end, it is beneficial to the patient.

In what sense does art resonate with health? This question connects with psychosomatic health. What is the link between the mind and the body? The *embodied theory of cognition* is such a theory. It has inspired articles on the perception of art (Joy and Sherry Jr, 2003; Freedberg and Gallese, 2007; Calvo-Merino et al., 2008; Xenakis and Arnellos, 2014; Kirsch et al., 2016; Arteaga, 2017; Koch, 2017; Mastandrea et al., 2019; Montero, 2018). Two anthologies have been published: *Embodied Aesthetics* (Scarinzi, 2014) and *Aesthetics and the Embodied Mind: Beyond Art Theory and the Cartesian Mind-Body Dichotomy* (Scarinzi, 2015). Although this massive contribution is relevant to the question of the role of the arts in Arts and Health, embodied aesthetics seems to have slipped under the radar of the field. Kirmayer and Gómez-Carrillo have argued for an approach in psychosomatic medicine ". . . that builds on recent work in embodied and enactive cognitive science" (Kirmayer and Gómez-Carrillo, 2019).

The application of embodiment to art, is developed in *Embodied Aesthetics* (Ticini et al., 2015). An article called *"The Embodied-Enactive-Interactive Brain: Bridging Neuroscience and Creative Arts Therapies"* has already been presented (Vaisvaser, 2021). This article is however based on the Bayesian approach to cognition and "predictive coding", which implies a *computational* understanding of the brain. This is at odds with enactive embodied theory.

The aim of this article is to answer the question "Why Art?" The approach is to present and discuss concepts developed in embodied and enactive cognitive science and present a "contextual framework"—"a network of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena" (Jabareen, 2009). I will refer to research in cognitive science, psychology, philosophy and neurology. Considering the complexity of the neurological response to art, it is a giant step to frame these interdependences. We must take into account that there is "still a long way to go before we understand enough about how large numbers of functionally disparate, interconnected neurons generate and use dynamics to control concerted, whole brain activity" (Whittington et al., 2018).

This calls for limitations:

1. Art is discussed in terms of "aesthetical contextualsim" (Levinson, 2007). This is just one of many philosophical art theories. This choice will be discussed and motivated.
2. "Context" is discussed according to "enactive embodied theory". This choice will be discussed and motivated.

3. The overarching concept "aesthetic empathy" is exemplified with music. This is because music is the most researched art form in neurology. Prerequisites for generalization to other art forms will be addressed.
4. The theoretical level is limited to a "*conceptual framework*". This is a first stage of theoretical development.
5. There is a lack of precision of concepts due to the semantic problem in the construction of a framework overarching behavioral sciences, neurology and philosophy. We have to settle with explanations of correspondences and correlates.

Outline:

1. *Aesesthetic contextualism*—a philosophical understanding of art based on contextual knowledge in art perception.
2. *The "representation war"*. This is an account for diverging understandings of "context" in the behavioral and brain sciences.
3. *Carving up "context" with ERP*. "Event Related Potentials" provide an entrance for an evidence-based discussion of "context".
4. *The state of the beholder.*
5. *The state of the artist.*
6. *Aesthetic empathy* understood as the relation between the internal state of the artist and the internal state of the beholder.
7. *A conceptual framework of musical empathy*. The dynamics of key concepts in enactive embodied theory exemplified by a conceptual framework of music. This is followed by a discussion concerning the prerequisites of generalization to other art forms and a framework for static art forms.
8. *Discussion:* How does the presented framework answer the question: Why art?

Aesthetic contextualism

"Aesthetic contextualism" is one of several directions in the philosophical discussion of art. The concept of "context" includes the state of the beholder in the discussion of art. So does in fact the concept of "aesthetics". It was adopted by the German philosopher Alexander Gottlieb Baumgarten from the Greek word "aesthesis" referring to qualities of sensation (N.B., the antonym "anesthetic", as in "anesthesia", meaning absence of sensation). Baumgarthen suggested that "aesthetics' could be used to mean the sense of beauty and taste (Baumgarten, 1763). Since aesthetics refers to sensations and taste, there is no such thing as an aesthetic object per se. The original understanding of "aesthetics' thus concerns the reaction of the beholder.

Philosophical theories of art tend to follow the art isms (Adajian, 2007). The modernism movement demonstrated that beauty is not necessarily an art property (as can be exemplified with Marcel Duchamp's *Fountain*). Anything could now be presented as art (e.g., Andy Warhol's *Campbell's Soup Cans*, or John Cage's composition *4.33* consisting of pauses and pauses only for 4 min and 33 s). This led on the one hand to a general skepticism about definitions of art, and on the other to all-inclusive, safe definitions, stating that anything presented as art, is art. Versions of this position include: Art is something produced by an artist, art is something exhibited by an art institution, and art is an agreement in the Art World. These definitions are circular. They do not present "an abstract idea to which the name (Art) is annexed".

The art critic and philosopher Arthur Danto suggested in the 1980s that the unspoken in the work of art, is an art property. He included an *ellipsis* in his definition—an empty space (…) to be filled by the beholder with 'art historical context". Danto (1981) argued that the difference between an art object and an everyday object is "not so much the kinds of object as the kinds of attitudes, and hence not *what* we relate to but *how* we relate to it". With this understanding, Danto downplayed the object in favor of the reaction, which makes his definition applicable to sentient art expressions such as "conceptual art" (which could be anything causing a reaction). Jerrold Levinson suggested the concept of *aesthetic contextualism:*

> Contextualism is the thesis that a work of art is an artifact of a particular sort, an object or structure that is the product of human invention at a particular time and place, by a particular individual or individuals, and that that fact has consequences for how one properly experiences, understands, and evaluates works of art (Levinson, 2007).

The word "context" is composed of Latin con: with, and text: textile, suggesting that something is perceived in a weave of information. In cognitive science (i.e., the study of the acquisition and use of knowledge), context means additional information. Additional, that is to the information provided by the object. Abstract art does not move non-artists emotionally as much as artists (Komar and Melamid, 1999; Vartanian and Goel, 2004; Vittorio, 2009), indicating that naïve viewers need to recognize something in the work that they can relate to, or identify with. This expertise/amateur relation to art is paralleled by responses to atonal music (Daynes, 2011). In atonal music, the harmonic context of the melodies is systematically removed. These two studies confirm that the contextual additive creates anticipations, which are crucial in perception.

Contextual information can be:

1. Situational: If we, in the case of Duchamp's *Fountain*, had encountered the work in a bathroom instead of an art gallery, the perception of the object would be different. If we had experienced absence of music, as in the case of Cage's *4.33,* outside a concert hall, we would not perceive it as art.
2. Congenital: Perception is species specific. The information in the DNA double helix expressed in the design of the perception organs, the structure of the body and action possibilities is decisive for perception.
3. Learnt: Individually acquired knowledge. In the case of a work of art, this can be knowledge about the style, as well as personal associations invoked by the work.

Levinson's definition of aesthetic contextualism, is restricted to cultural knowledge. Cultural knowledge is required to identify, understand, and evaluate art, but art is more than this. Art causes physical reactions: tears, goose flesh, accelerated heartbeats, smiles, etc. It can make us feel fear, love, longing, and awe. The perception of art involves commitment, engagement, identification, and acting out (as in the extreme case of "head banging"). In one word—we *live* the artwork with our bodies. The art historian David Freedberg and

the neuroscientist Vittorio Gallese has claimed that embodiment is fundamental in the perception of art:

> We propose that a crucial element of esthetic response consists of the activation of embodied mechanisms encompassing the simulation of actions, emotions and corporeal sensation… (Freedberg and Gallese, 2007).

Aesthetic contextualism is considered here for the following reasons:

1. Context is mandatory for perception. "No perceptual task takes place in a contextual vacuum" (Abney et al., 2016). Without context, we cannot even perceive a work of art.
2. We cannot expect art to mean something, if it does not relate to the experience we carry into the meeting with the work. The experience of anguish is a prerequisite to the perception of *The Scream* by the Norwegian painter Edvard Munch. The same can be said about the experience of horror for the perception of Edgar Allan Poe's poem *The Raven*, the experience of suffering for the perception of Billie Holliday's interpretation of *Strange Fruit*, and the experience of father-son relations for the perception of Tennessee Williams' play *Cat on a Hot Tin Roof*. Etcetera.
3. Aesthetic contextualism includes the beholder in the understanding of art, which is a prerequisite for the idea of Art & Health. Specifically, the interactive role of the beholder enables an *enactive embodied* understanding of art (Xenakis and Arnellos, 2014).
4. Contextual anticipation has a well-researched psychosomatic effect—the placebo effect (Schwarz et al., 2016).

To present an enactive embodied version of aesthetic contextualism, is to take a stance in the "representation war" (Constant et al., 2020). This war concerns the lack of consensus in the understanding of context in perception. Next, I will make a brief account for the positions in this debate and defend an enactive, embodied approach.

The representation war

The battle line in the "representation war" is drawn between *computational theory* emanating from Jerry Fodor (Fodor, 1975), and *embodied theory* in the wake of Maurice Merleau-Ponty (Merleau-Ponty, 1945) and James Gibson (Gibson, 1977). "Computationalism" is inspired by the function of computers. Computers can perform several cognitive functions (e.g., memory, calculation, communication, orientation). Acquisition and use of binary information in synapses (spikes) can be modeled with computers. Embodied theory, by contrast, states that the brain can only be understood as a part of a body interacting with its habitat. This has led to separate terminologies. The dividing line appears clearly in the distinction between *predictive coding*, and *embodied anticipation*.

The basic idea in "predictive coding" is that the perception of an environmental parameter results from two distributions of probabilities of information: the expected, and thus contextual outcome and the input (Adams et al., 2013). Applying Bayesian statistics, a third distribution of probability can be calculated, which contains information from both distributions. According to the theory, this third distribution is what we perceive.

Computational theory raises questions:

1. We do not perceive objects as compromises of possibilities, as the Bayesian approach implies. We perceive them as either this or that. If we, to take an example, expect the next tone in a melody to be a C and the played tone is a G, the resulting perception could never be a compromise weighing these two possibilities. This would make music listening unbearable. Music listening requires exact discrimination of pitch relations (Peretz, 2016). In general, the classical bi-stable images in Gestalt Psychology demonstrate that we can only perceive one possibility at a time.
2. The brain is not just hardware and software. "Give a computer the same input and you should get back the same response every time. But give a human brain the same sensory input and you will see a range of different responses. This is because the brain's response to sensory input depends not only on the properties of the input, but also on its own *internal state* at the time when the input is processed" (Iemi et al., 2019) (my italics). The internal state fluctuates due to emotions. Biochemical aspects of emotion (e.g., neurotransmitters) provide the milieu where endogenous neural exchange of information takes place. "Emotions modulate virtually every aspect of cognition" (Tyng et al., 2017). This statement can be reversed; cognition modulates emotion (Ochsner and Gross, 2005). A theory of perception thus must include emotion. Emotion is as much a body state as a brain state.
3. Computers do not oscillate. Brains do. The research of neural oscillations has revolutionized the behavioral and brain sciences. This is accompanied by theoretical development such as Neural Resonance Theory (Large, 2008) for music perception and the Binding by Synchrony Hypothesis (Singer, 2007), suggesting that synchronized oscillations bind distributed brain activity.
4. Is "code" a useful concept? "Predictive coding" presumes that the brain makes inferences from its own coded activity. This issue is called the "symbol grounding problem", which reads: "How can the interpretation of a symbol system be made intrinsic to the system?" (Harnad, 1990). If the code cannot even theoretically be decoded, it is not a meaningful concept. On these grounds, the code-metaphor, cemented in neurology as it is, has been questioned (Brette, 2019). This is however not self-evident. It is hard to deny that the environment is "encoded" (since environmental information is transformed into electric neural activity) and it is hard to deny that neural activity is "decoded" (since we do perceive the environment). The problem with the code-metaphor is that it easily presumes an interpreter, which leaves us with the problem to find a homunculus in the brain. The solution may be that the "code key" is intrinsic to the system. It is arguable that the key is DNA-information converting action to perception and perception to action, and thus that every living organism and every cell in this organism has access to the "key".

Embodied theory emanates from Merleau-Ponty's phenomenological theory of perception. It involves the physical

attributes of the body and bodily skills in the perception of objects and events (Merleau-Ponty, 1945). The fit between the ability of the body and the environment results in an *intention* to act. The understanding is however not that we perceive the environment and decide to act on it, but that perception and action are interwoven. They are two sides of the same coin: *perception-action.* Mingers, considering the smallest unit of life—the cell (e.g., an amoeba or a neuron)—states that it has "…both a sensory and an effector surface" (Mingers, 1991). This makes perception-action an undividable biological unit. The one cannot exist without the other (e.g., seeing and the accommodation of the eye-lens). This is congenital, but just to a certain extent. Perception-action is also learnt. The exploration of the world by reaching, touching and tasting is typical for babies. This coordinates motor activity with sensory feedback. Viewing a cup is to actualize earlier experiences of reaching for it, grabbing it, lifting it, holding it to our lips, drinking from it and so forth. This is called perceptual learning (Gibson, 1969). If we consider DNA as the "code key", we learn how to use this key. Perception-action is embedded in the organism at every level. It unites the organism with the world. Gibson (1979) suggested the concept of *affordance*, to denote that an object affords action possibilities, given the design of the body. When we perceive an object, we automatically actualize action opportunities. Gibson specifically pointed out that the affordance "cuts across the dichotomy of subjective-objective" (Gibson, 1979, p. 4).

The beauty with the "affordance" concept is that is unites cognition with emotion. Environmental information concerning food is an affordance, only if we feel hunger. If we are hungry, we tend to detect food. This is reciprocal. If we smell food, we tend to get hungry. This illustrates the cognitional-emotional interdependency.

Perception-action penetrates the border between the organism and its environment, allowing for an analysis of cognition as an information system, consisting of interacting subsystems (e.g., the organism, other agents, surroundings).

Gibson proposed that "the perception apparatus" "tunes in" to the environment. He described the fit of environmental and endogenous information as "resonance":

> Instead of supposing that the brain constructs or computes the objective information from a kaleidoscopic inflow of sensations, we may suppose the orienting of the organs of perception is governed by the brain so that the whole system of input and output resonates to the external information (Gibson, 1966, p. 5).

Gibson treated "resonance" and "attunement" as two complementary mechanisms. He claimed that a "perceiver is a self-tuning system" and that the development of this attunement, or "the education of attention, depends on past experience but not on the storage of past experiences" (Gibson, 1979). The phrase "education of attention" suggests that we learn how to perceive (i.e., "perceptual learning"). The phrase stating that this "…depends on past experience but not on the storage of past experiences" proposes that experiences leave traces in the nervous system, but that this does not entail that memories are stored in the brain like books in a library.

Gibson's theory is still relevant in contemporary debate and research. "Resonance", "attunement" and "pick-up" are however metaphors. The more exact understanding of these concepts has occupied the behavioral and brain sciences since.

There are two schools of embodied theory. "Enactive theory" is contextual, whereas "radical embodied theory" claims *direct perception,* which means that all the information in perception is environmental. Chemero argues that it follows from Gibson's ecological approach to perception that perception "does not involve computation or mental representations", and that perception "is primarily for the guidance of action, and not for action-neutral information-gathering". He draws the conclusion that since "perception does not involve mental addition of information to stimuli, yet is able to guide behavior adaptively, *all the information* necessary for guiding adaptive behavior must be available in the environment to be perceived" (Chemero, 2013) (my italics). This cannot be concluded from Gibson's theory, since the resonance metaphor suggests a fit of two variables of information. Action possibilities are constrained by species-specific information as well as individually acquired knowledge how to move (skill). This is also the position of Merleau-Ponty who emphasized that perception depends on physical attributes of the body and bodily skills. Merleau-Ponty labeled action possibilities "the body schema" (Merleau-Ponty, 1945). The body schema is thus contextual information in perception-action. This does not require awareness.

Chemero's position is contradictory to consensus in cognitive science. "No perceptual task takes place in a contextual vacuum" (Abney et al., 2016) 2016. Astonishingly, Chemero is co-author of Abney's article, implying that he does not see context as additional information. The article exemplifies contextual influence with the perception of bi-stable illusions, showing that it is hard to perceive objects if we do not know what to look for. Anthony Norcia's "Coffer Illusion" demonstrates that circles in a presented picture cannot be perceived if we do not know that there are circles to be found. Even more striking is Daniel Simmons' "monkey business illusion" (Simons, 2010). Simons presented a video showing people passing a ball between them. Viewers were asked to count how many times the ball is passed. In this video, someone dressed as a gorilla enters the scene, steps up in front of the camera and salutes the viewers with a drum vortex against her chest. Still, 50 % of the viewers do not see the gorilla if they are not informed that a gorilla will appear. Furthermore, the classical ambiguous pictures in Gestalt psychology, illustrate that we can control cognitively what we see.

What then do radical cognitivists claim? Raja states: "The basic framework of direct perception is that there are high-order variables that specify the features of the environment and that perceivers detect them without any kind of cognitive load or information processing (Raja, 2019). As an example, Raja proposes a literal understanding of Gibson's concept of resonance and compares perception with the resonance of musical instruments. This implies that the nervous system resonates to environmental features just as the strings in a piano resonate to a voice singing into it. "Non-linear resonance may be the way perceptual systems self-modulate and are modulated in their relation to perceptual information, thus being able to exhibit changes in the detection of such information" (Raja,

2018). Here, Raja refers to Neural Resonance Theory (Large, 2008).

Raja's statement is self-contradictory. A variable, "higher order" or not, *is* information. Resonance concerns the fit between two variables of information. This claim has been proved in original research explaining resonance with information theory (Goychuk and Hänggi, 2000; Rosso and Masoller, 2009). Information system theorists point out that it is important to note that "…an affordance arises from the user/artifact relation, not just from the artifact" (Fromm et al., 2020). Furthermore, "self-modulation" implies learning. Learning concerns acquisition of information. The nervous system *learns* how to resonate with environmental rhythms by means of plasticity (Tichko et al., 2022).

Enactive theory is a description of the interplay between the subjective and the objective:

> We propose as a name enactive to emphasize the growing conviction that cognition is not the representation of a pregiven world by a pregiven mind but is rather the enactment of a world and a mind on the basis of a history of the variety of actions that a being in the world perform (Varela et al., 2016, p. 9).

Enactivists argue that organisms know how to interact with the environment through the history of the species interaction in its domain and by individual learning (Maturana and Varela, 2012). Varela and Maturana described the interdependence between the organism and the surrounding as a *structural coupling*. Structure, contrary to entropy, is selected information. Structural coupling thus concerns a fit of information. Mingers exemplifies with light-sensitive neurons that "it is the structure itself that determines what can be a trigger for it" (Mingers, 1991). The same is obvious in the case of piano strings. Gibson's resonance-concept suggests a structural coupling, but structural coupling is the wider concept. In both cases, perception concerns a fit between environmental information and endogenous information. Just as the "affordance", structural coupling cuts through the subjective and the objective.

To conclude: In spite of the progress in neurology, the "representation war" reveals that, there is no consensus in the understanding of perception. The terminology is metaphorical (e.g., "codes", "computations", representations", "processing", and "resonance", "attunements", "affordances" respectively). I strongly suspect that differences in this "war" is due to differences in the understandings of the metaphors. In order to come to an armistice, the terminology needs to be specified. This requires an evidence-based discussion. Specifically, we need to carve up the term "context" into an operational understanding. Neurological research of *Event Related Potentials* (ERPs) offers an entrance to this discussion.

Carving up context with ERP

EEG is a conglomerate of electrical activity emanating from neural oscillations generated in single neurons, pairs of neurons, and fields of neurons. The EEG consist of components, associated to states, behaviors and tasks. Violations of expectancies, so called "prediction errors" are detected as changes in EEG potentials. These brain reactions are called "event related potentials" (ERPs). The ERP reaction indicates a conflict between endogenous (i.e., contextual information) and exogenous information. This is an indirect way to assess context. Reaction times on violations differentiate between the components of expectancies. Although ERPs initially were found for visual surprises (Squires et al., 1975), it is an excellent approach to investigate expectations in music.

A specific ERP, the "early right-anterior negativity" (ERAN), has been detected for tones which do not fit into harmonic context (Koelsch et al., 2018). Interestingly, this reaction is detected not just in the brain of the listener but also brain of the musician, even if the "error" is deliberately planted. This demonstrates that although the musician has an accurate expectancy, her brain reacts as if surprised. The authors interpret ERAN as a violation of "musical syntax", arguing that the perception of a tone out of harmonic context can be compared to the perception of a word misplaced in a grammatical context. Following Neural Resonance theory, it is however conceivable, that ERAN indicates a mismatch of oscillations.

Music is a cultural application of universal laws of acoustics. In short, the timbre of a played tone is defined by the overtone series (the harmonics). The scales used in music in all cultures can be derived from this overtone series (Large et al., 2016; Kim and Large, 2019). The overtone series consists of resonance relations. Melodies and harmonies are made up from these relations.

Neural Resonance Theory states that music perception should be analyzed as resonance between exogenous oscillations (the soundwave) and endogenous oscillators (neural) according to nonlinear dynamic systems theory (Large and Kolen, 1994). This is fully developed in (Large, 2008). The theory requires that chemo-electrical biological systems can be regarded as physical systems, allowing for physical laws of resonance to be applied to the nervous system. Large describes how excitatory/inhibitory neural ensembles sustain oscillation and knits this to the structures of the hearing apparatus such as the cochlea and the auditory cortex (Large, 2010). One to one resonance between exogenous oscillations and endogenous oscillations explains the perception of musical beat (Large et al., 2015). Large and colleagues also model "mode-locking", which concerns how the harmonics in one wave locks to harmonics in another, such as the prime to the octave, the prime to the fifth, the fifth to the third etc. This cross-frequency locking is relevant to the perception of tonality (Large et al., 2016) as well as the perception of consonance/dissonance (Kim and Large, 2019). According to the theory, tones outside the harmony cause a clash in resonance between exogenous oscillations and endogenous oscillations. A prerequisite for oscillatory explanation of dissonance is that pitch differences can be discriminated with high precision. Humans can differentiate pitch differences down to 0.2%. Single neurons cannot oscillate fast enough for this precision. This requires a subsequent temporal analysis. In a review of oscillations in the auditory system (Bahmer and Gupta, 2018), the authors show that "…the ability of humans to distinguish changes in pitch can be explained as a precise analysis of temporal information in auditory signals by neural oscillations".

Neural Resonance Theory claims lawful activity in perception. Dubois differentiates between two kinds of anticipation. Anticipation is "strong" when it is "not based on a prediction from

a model of the physical system but is embedded in the fundamental system" (Dubois, 2000). "Weak anticipation", by contrast, is based on a model. Weak anticipation does not entail that this model is stored as an available representative memory in the brain, but as an simulation (Stepp and Turvey, 2010). In terms of neural activity, calling to mind "…involves reactivation of traces left by perceiving" (Anderson, 2014, p. 96). This implies that weak anticipation requires learning. The recall is an imagination caused by a simulated perception in reused traces.

Violations of strong anticipations in music can according to Neural Resonance Theory be exemplified with a change of rhythm, a change of tonality and dissonances (i.e., purely physical violations), whereas violations of weak anticipations are caused by deviations in musical styles. A violation of a strong anticipation would always elicit a neural reaction, irrespective of mental expectation, since it is a law bound mechanism. In other words, it does not matter if the musician knows that she is playing outside the harmony, there is still a clash in resonance and the brain reacts, as indicated by ERAN. The violation is felt, not just by the listener, but also by the musician. This is because mismatches are arousing. The unexpected move in music (e.g., change of melody, tonality, volume, harmony, instrumentation, rhythmical accents) is accompanied with physiological reactions—which can be assessed as pilo-erection (gooseflesh), accelerated heart rate, diminished heart rate variability, accelerated respiration, diminished finger temperature, and increased skin conductance, indicating arousal (Vickhoff et al., 2012). The arousal calls attention to the unexpected event.

The planted surprise is common in music. In jazz, this can be exemplified with the "in-out" technique, signifying that the soloist plays alternately inside and outside the harmony given by the succession of chords. Notably, soloists on such wild excursions often lean sideways as if stepping out of the body (where the anticipation resides) and into unpredictable territory.

The ERAN reaction is fast. This suggests that violations of strong anticipations are less time-consuming than violations of weak anticipations. Reaction times also separates unattended reactions (fast) from attended reactions (slower) (Rohaut and Naccache, 2017). This confirms the preconscious side to perception. It leads to the question: How can we predict, if we are not aware of what to expect? Dubois showed that biological systems can anticipate without awareness. He modeled strong anticipation mathematically by the mechanism of "delay coupling". This implies "coupled systems of previous sections where a delayed system is synchronized with the non-delayed version of itself, i.e., a coupling arrangement" (Dubois, 2000). This "anticipation" is not a subjective hunch that something will happen, neither does it require a predicting homunculus in the brain. In Dubois' understanding, "anticipation" is rather a literal translation of Latin "anticipates", from ante (pre) + cipare (take). In the following, I will call this the "pre-take" to avoid confusion with subjective anticipation. The nervous system pre-takes a state to the effect that we perceive moving objects where they actually are, which would be impossible due to neural delays. This can be associated to Nijhawan's "motion extrapolation in catching" (Nijhawan, 1994), later referred to as the "flash lag" effect for the visual system (Nijhawan, 2002).

How do we coordinate our movements with environmental events, such as Djokovic's return of tennis serve, the peregrine's catch of a starling, or the musician performing in rhythmic synchrony with an ensemble? A first requirement is that objects are perceived where they actually are (in spite of neural delays). A second requirement is that our own movement must be initiated ahead of the event. Indeed, ERP-studies demonstrate not just a post-stimulus reaction, but also a pre-stimulus reaction on events presented in a sequence (Niemi and Näätänen, 1981). Predictive timing involves a hierarchical network of oscillators (Arnal et al., 2011; van Ede et al., 2011).

Coordination and timing is important, not just for sports and music, but for every situation in life. Dubois offers an approach to this so far unsolved problem. His theory of anticipation goes hand in hand with Neural Resonance Theory. Original research reveals that external periodical sounds produce bursts of neural gamma oscillations on sound onsets. These bursts continue when the stimulus is omitted (Snyder and Large, 2005). The burst on the omitted sound is a pre-take.

Mismatches can be attended, or not. The study of "amusics" in ERP research illuminates this distinction. Amusics are people who are unable to perceive music as music, due to congenital or achieved impairment (Peretz et al., 1998). "Amusics fail to detect 'wrong notes' that violate pitch regularities of Western music" (Peretz, 2016). ERP studies indicate that amusics react on pitch violations (measured as "mismatch negativity"), just as accurately as control groups do (Moreau et al., 2013). The groups however deviate in ERP "positivity" (P300/P600) which signifies awareness. Amusics do not have this reaction. This made Peretz conclude: "The core deficit in congenital amusia resides in a lack of conscious access to processed pitch deviances" (Peretz, 2016). There is a mismatch, and the brain reacts to it, but the listener is not notified. An even more striking example of non-attended brain activity in music perception, is provided by the finding that amusics, in spite of their inability of conscious discrimination of pitch, can imitate melodies (Hutchins and Peretz, 2012). This underlines that perception-action is a pre-conscious undividable biological unit. Interestingly, "amusics" are emotionally affected by music. They can account for these feelings just as well as other people can (Peretz et al., 1998). Meaning demands consciousness but meaning is not always required for emotional experiences—feelings. Meaning can be a consequence of feelings. If an activity feels right, we tend to come up with arguments for that activity—rationalizations.

ERP-reaction times reflect phylogeny (Scheumann et al., 2017). The reaction times indicate that perception-action is the original building block of cognition and that this has been "embellished" with awareness later. The snake bites. This does not demand awareness. It is DNA information in action. It is reptile brain function.

ERP research confirms enactive theory. Coupling between the organism and the environment is indirectly demonstrated, since ERPs are reactions of the opposite. This involves structural coupling since a structure is constrained information. This understanding is consistent with Neural Resonance Theory, which concerns resonance between two variables of information: the structure of the exogenous wave and the structure of the endogenous wave. Coupling implies synchronization of

endogenous and exogenous sequences of information; mismatch is desynchronization.

There is a debate concerning the neural underpinning of the ERP-reaction. The *phase reset model* (Sauseng et al., 2007) claims that the reaction reflects a change in background neural oscillation. This has been demonstrated by original research (Mormann et al., 2005; Rizzuto et al., 2006; Jutras et al., 2013; Woolnough et al., 2022). New evidence . . . "provide strong support for the unification of neuronal oscillations and evoked responses (Studenova et al., 2021). Raja and Anderson suggest that the reset is a bifurcation in a meta-stable system (Raja and Anderson, 2019), where the meta-stable system is the pre-stimulus internal state. In dynamic systems theory, a "bifurcation" is a small manipulation causing dramatic qualitative change in the system.

The reactivation of brain areas for memory tasks indicate that each type of memory can be described as an "alliance of brain regions" connected by "frequency-specific patterns of interregional phase synchronization in large-scale networks" (Dudai and Morris, 2013). The authors claim that these patterns provide multiple contextual information concerning a passed event. This makes the ERP reaction an important learning factor (Tseng et al., 2007). Mismatches dissolve these networks by way of desynchronization and reconnect to them to new alliances by way of synchronization. This is in accordance with the *Binding by Synchrony Thesis* (Singer, 2007), claiming that neural oscillatory synchronization binds distributed activity. Singer's thesis is confirmed by original research. Cortical networks are connected by synchronized brain oscillations (Düzel et al., 2010; Bechtel, 2013). This makes neural networks temporary. They are established through synchronization and fall apart when desynchronized. Repeated confirmation of matches, strengthens the connections in the network (Hebb, 1949). Repeated mismatches dissolve them.

To sum up:

1. The ERP reaction signifies a mismatch between an environmental event and the pre-take.
2. The pre-take synchronizes the organism with environmental sequences.
3. The pre-take is an enactment.
4. The pre-take requires endogenous information. This information is contextual.
5. The ERP reaction is an inverse index of structural coupling.
6. The ERP reaction signifies an instant change of context.
7. Short reaction times indicate violations on "strong anticipations". This is just a misfit of information. Consciousness about the expectation does not interfere with the reaction. Even so, the reaction can be felt.
8. Longer reaction times indicate "weak anticipations". This reaction concerns misfits of learnt models (i.e., simulations) and environmental information.
9. Since weak anticipation is based on a model, it is a representation, and if attended, it is a mental representation.

ERP research shows that perception always depends on endogenous activity constituting information, such as the structure of brain waves. This contextual information can be representative or not, attended or not. Cognition is reciprocally dependent on endogenous and exogenous information.

The ERP technique provides a possibility to operationalize context, since it is an index of contextual mismatches. Context can thus be assessed as missing components in ERP.

This understanding of context is relevant for an updated understanding of "aesthetic contextualism". I will proceed by discussing art as the relation of endogenous activity of the artist and the endogenous activity of the beholder—as empathy. This demands an encircling of the state of the beholder at the moment of art perception and an encircling of the state of the artist at the moment of creation (or performance).

The state of the beholder

"Aesthetic contextualim" implies that the information in the work of art is related to a weave of information at perception. This is the cognitive side of perception. Cognition and emotion are however interdependent. In order to discuss the perception of art, we must consider the *state* of the beholder—the total being, the embodied mind, including memories, emotions and the conception of the self.

Enactive embodied theory implies that memory is a neural simulation of the activity at previous perception-actions. Traces from previous perception-actions are according to the Hebbian plasticity rule strengthened by repeated use (Hebb, 1949). The state of the beholder of art is continuously changing, as aspects of the work of art activate these paved traces.

I will make a brief account of behavioral aspects of memory and argue that all memories are embodied and emotional. The purpose is to demonstrate that enactive embodied theory is valid for the perception of art.

Associative memory is "the ability of living organisms to perceive contingency relations between events. . . it allows anticipation of an event on the basis of another" (Jozefowiez, 2012). This is the brick of learning. Memory, even at this basic level, is anticipative and thus contextual. Examples of associative learning are classical (Pavlov, 1910) and operant (Skinner, 1963) conditioning. As demonstrated by Pavlov, the ring of a bell can be associated to food. He measured this association as salivation in dogs. This experiment illustrates that perception-action is a learnt application of a congenital capacity. The bell becomes an affordance, as indicated by salivation. Associative learning appears at all levels in the animal realm. Even insects are capable of associative learning (Polilov et al., 2019). A design for temporal sequence learning based on associative learning has been presented (Bose et al., 2005), suggesting that associative memory is the building block of sequenced memories. It is however not enough for the timing of the events in a sequence, just for the order of events.

Associative learning is relevant for the perception of art. The bell in Pavlov's experiment is an arbitrary sign (i.e., there is nothing connecting the sound of the bell with food before the association is made). The bell could be replaced by the word "food". This makes the sound of the bell a *symbol* for food, rather than an iconic or an indexical sign in Charles Sanders Pierce's sign system (Misak, 2004). This extends embodiment of art to the rich domain of symbols. Words, sentences, poems, novels, lyrics in songs and notes on a

sheet of music are embodied through associative learning. We strive with the mountaineer Hillary in "High Adventure", drink with Hemmingway in "The Sun Also Rises", feel the humiliation of the characters in Steinbeck's "Mice and Men", and are sexually aroused by Anaïs Nin's "Delta of Venus." Pavlov's experiment could concern indications of sexual arousal to Nin's text, just as well as salivation to the bell. This makes Nin's text an affordance.

The British philosopher Gilbert Ryle made a distinction between *declarative knowledge* as the knowledge of *what*) and *procedural knowledge* (the knowledge of *how*) (Ryle, 2009). The former concerns facts presented as symbolic representations and the latter *skill*—knowledge of how to perform an action, such as riding a bike. Procedural knowledge is *implicit*—knowledge that cannot be accounted for. It is learnt by trial and error (plasticity and prediction errors).

Skill is an everyday connotation of art. We perceive the skill of artists as manifested in their works—as a quality. Skill is not just about the ability to perform; it is also essential in perception. Sports commentators recruit former athletes as sidekicks. Athletes know how to perform technically and see details others cannot see. It follows from the mutual interdependency in perception-action (and makes sense), that we feel the skill of the artist through our own skill. We perceive dancing through our own ability to move, melodies through our own ability to sing, etc. This is in accordance with the finding that action observation "activates premotor and parietal areas in a somatotopic manner" (Buccino et al., 2001). Buccino concludes that the observation of an activity automatically activates the same sensorimotor network as when we perform the activity ourselves, even if we do not move. Viewing someone do something is a simulation of the act—an enactment. Skill, in terms of action-possibilities, is contextual in perception. The research of the importance of skill in art perception, is still in an initial state. It indicates that the skill of the beholder is correlated to a positive response to the work (Kirsch et al., 2016).

Skill is obviously embodied knowledge, but so are symbolic representations. As concluded from Pavlov's experiment, it does not matter if the dog is presented with food or a symbol for food, once the association is made.

Perceptual learning (Gibson, 1969) is closely related to skill, since skill is mandatory to perception. Perceptual learning can be exemplified with the "reversed goggles" experiment, where the subject learns to navigate although the inflow of visual information is reversed (Harris, 1965). Recently (Tichko et al., 2022) presented a framework demonstrating how an endogenous motor planning oscillatory network learns to perceive exogenous rhythmic patterns. The authors connect this learning to James Gibson's concept "attunement", suggesting that the organism learns how to "tune in" to the external source. Perceptual learning is a developmental process combining short-term plasticity and long-term plasticity (corresponding to short-term memory and long-term memory). According to the authors, plasticity can be fast enough for a child to learn to entrain a rhythm while listening.

Episodic memories, are "retrieved personal experiences and their temporal relations" (Tulving, 1972). Episodic memory implies an activation of motor areas (Nilsson et al., 2000). It is thus a replay of a sequenced event involving motor activity. This makes it related to skill. The recall of a song is an episodic memory, since it is a retrieval of a personal experience replayed by the brain with the temporal relations intact.

Autobiographical memories are memories connected to an individual's personal history. They make up the sense of who we are and are thus of existential importance. Autobiographical memories are closely related to episodic memories (Conway, 2001; Gilboa, 2004), although autobiographical memory is the wider concept. Familiar music triggers autobiographical memories. The replayed sequence opens a window to the past. Music has marvelous effects on demented people (Sachs, 2008). Demented residents in elderly care, totally locked into themselves, starts moving when listening to music, suddenly expressing themselves emotionally. They light up, and when asked, they can give a detailed account of when and where they first heard the music, the name of the band, the name of their dancing partner etc. Perceiving music as a composition by Pat Metheny, involves an actualization of going to a concert and enjoy music in company with lovers of jazz guitar music. It entails the identification of the self as a member of this tribe of good taste and skill. The music psychologist John Booth Davies coined the autobiographical effect "Darling, they are playing our tune" (Davies, 1978). This is beautifully illustrated with the song *As times goes by* in the classical film *Casablanca* (1942), including Ingrid Bergman's classical line: "Play it again, Sam!"

Autobiographical memory engages a broad neural network (Bréchet et al., 2021). The mnemonic power of music is well-researched (Yalch, 1991; Wallace, 1994; Rainey and Larsen, 2002; Moussard et al., 2014; Thaut et al., 2014). Thaut's study provides evidence that music induces "oscillatory synchrony in neural networks underlying memory". It has been shown that music listening enhances synchronization in the alpha2 band, demonstrating an increase of functional connectivity (Wu et al., 2013). External auditory rhythms stimulate memory in patients with Alzheimer's disease (Clements-Cortes et al., 2016). This effect can also be achieved by transcranial rhythmic stimulation (Bréchet et al., 2021). The research indicates that exogenously induced rhythm synchronizes and connects brain areas.

Taken together, these studies suggest that the mnemonic power of music depends not just on associative memory but also on brain resonance to musical rhythms. It is however not likely that the neural frequency connecting brain areas complies with the rhythm in the specific piece of music at hand. There are nonetheless three factors to consider:

1. Musical rhythms include a broad spectrum of subdivisions of the beat, played by the drummer as well as other instrumentalists (performed as ¼ notes, 1/8 notes, 1/16 notes etc.).
2. Cross-frequency coupling, which means that harmonics of the beat resonate with brain oscillations.
3. Perfect conformity between frequencies is not required for resonance. Brain resonance to a tone is a so called "Arnold tongue" with an "envelope" centered around the pitch.

Music can cue to memories, just as other things or events can by means of associative learning, but the reason why music is so effective is the rhythm "massaging" associative connections.

Emotional memories are memories connected to emotions. Since all memories are more or less emotional, this is rather an aspect of memory than a category. The word "emotion" consist

of "em" (within) and "motion", i.e., to be moved from within. The mere word reflects the human experience that emotions are bodily displayed. (Hajcak et al., 2007) showed that emotional pictures presented to subjects affect the motor evoked potential in the supplementary motor area (SMA). SMA and the pre-SMA are motor planning areas. In a review article on SMA function (Lima et al., 2016), the authors specify that the border between the pre-SMA and the SMA has been repeatedly associated with emotional music and emotional prosody. "Emotional prosody" refers to the observation that the same sentence can be delivered in different ways, depending on the emotion of the speaker. Since music as well as prosody is produced through motor activity, both contain information concerning a motor sequence. The research on the role of SMA/pre-SMA demonstrate reciprocal motor-emotion dependencies.

This review exemplifies two reciprocal dependencies: motor activity and emotion, and motor activity and memory. This supports embodied cognition theory.

The understanding that a memory is a reactivation of a neural network involving motor function is expressed in *The Sensorimotor Model of Memory*. The model states that…

> "…a given event fundamentally consists in perceptual information so that a reactivation of the same sensorimotor circuitry originally involved in its perception is also at stake whenever the event is recalled or comes to mind. In this respect, remembering is tantamount to creating mental simulations of bodily experiences in modality-specific regions of the brain. Memory consists in partial (or covert) reenactments of sensory, motor, and introspective states…" (Ianì, 2019).

This suggests that calling to mind is an imagination, based on a simulation. The Sensorimotor Model of Memory predicts that the neural activity at recall is correlated with the neural activity at perception. Ianì reports evidence for three kinds of correlated motor activity at recall and perception:

1. Movements connected to emotions, such as gestures, facial expressions, prosody and music)
2. Motor activity in perception-action, such as eye movements and touching (or, very convincing, the phenomenon that my dog starts waving his back leg, when scratched behind the ear)
3. Implicit motor simulation of the movements of an observed person.

It follows that motor activity is a mnemonic to experienced events (since motor activity is crucial in the alliance of brain functions involved in memory). This enables an activation of a wide context including autobiographical memories.

Discussing the mnemonic power of motor activity, it is informative to consider the role of the sequence. Just as the sequence of notes is decisive for the flowing hands of a pianist, the brain sequences action patterns over time. We can only retrieve a sequence in the learned direction. The difference between recalling a sequence (e.g., a song, a telephone number, or a dance) forwards and backwards reflects this power. The finding that motor cortices are activated in the recall of a sequence of abstract geometrical figures (Schubotz and Von Cramon, 2004) suggests that sequenced motor activity can pre-take any kind of sequenced information.

Does the brain host a "sequencer"? If so, where is this "sequencer" situated? (Buzsáki and Tingley, 2018) point to the hippocampus. The authors propose that the hippocampus produces a "sequential content-free structure" which connects to any functional area to produce a sequence of actions or sensations at recall. This hypothesis is supported by oscillatory interdependences between hippocampal rhythms and cortical rhythms in general (Feenstra and Holsheimer, 1979; Colom et al., 1988; Siapas et al., 2005). This theory however needs to be nuanced as indicated by the case of Clive Wearing (Wilson and Wearing, 1995). Wearing was a musician suffering from herpes encephalitis impairing the hippocampal area. Wearing was unable to remember anything that happened to him but could still perform as a pianist. This suggests that motor planning areas have their own "sequencers" or even that their main function is to send sequenced impulses to the body. It has been shown that the pre-motor supplementary area has "a critical role…in the organization of forthcoming movements in complex motor sequences that are rehearsed from memory and fit into a precise timing plan" (Gerloff et al., 1997).

Wearing could not remember what happened to him recently, but he could remember the past (e.g., he remembered his wife, but as he turned away from her, he forgot that she was present in the room). This is in accordance with a classical study (Scoville and Milner, 1957), stating that hippocampal function is critical to normal memory function, but not to early memories and technical skills, as well as recent findings showing that this area is critical in associative learning but not in retrieval of memories (Caviezel et al., 2020).

The Scoville and Milner study is an example of early explorations of the brain, based on conclusions from brain damage/lesion studies, "which identify *necessity*" (Dudai and Morris, 2013), leading to a segmented understanding of the brain (e.g., Brodmann's map of 52 function-specific areas). Later approaches measure *correlates* of activities leading to patterns of synchronized activations. This is developed by Anderson in the "Reuse Approach" (Anderson, 2014). The approach postulates that the same brain structure can be involved in a diversity of tasks depending on how it is connected to other brain structures. This has been compared to modern soccer (total football), where every player can take on any task (Raja and Anderson, 2019). Not even the auditory cortex is engaged solely in hearing (Anderson et al., 2013). Without the auditory cortex, we cannot hear, but hearing is just one function recruiting this area. Brain structures of are connected and reconnected depending on the task. Function depends not just on functional brain structures, but also on the structure of the pattern of structures. This is reciprocal; global structure affects the function of local structures.

The activation of reused traces depends on plasticity, which according to the Hebbian rule are synaptic connections strengthened by repeated use (Hebb, 1949). This understanding has been extended to involve oscillatory plasticity (Hoppensteadt and Izhikevich, 1996; Trevisan et al., 2005; Düzel et al., 2010; Clements-Cortes et al., 2016; Bréchet et al., 2021; Kim and Large, 2021).

Anderson's "reuse approach" provides a general explanation of how brain functions acquired "first in both evolutionary and developmental time (e.g., perception, motor control) are reused in functions that come later)" (Raja and Anderson, 2019). This

suggests that the complex neural activity involved in the perception of art, can be derived from basic perception-action. Gibson argued that it does not make sense to speak of two separate kinds of perception, an ordinary and an aesthetic one (Gibson, 1975). Art is however not an ecological domain. If we are to explain aesthetic experiences by embodied theory, we must assume that faculties developed in ecology are recombined and reused in the perception of art.

Reuse in art can be exemplified with musicality. Musicality (or something like musicality) can be traced in various species such as parrots, songbirds, elephants, seals, and bats. These species can learn vocal sounds and entrain rhythms. Interestingly, they share a neurological trait with humans: the connectivity between vocal motor structures and auditory structures (Patel, 2014). This sensorimotor coupling is genetic, (Pfenning et al., 2014), reciprocal (Phillips-Silver and Trainor, 2005) and presumably oscillatory (Large et al., 2015). It is a prerequisite for imitation of sounds. Vocal imitation demands that heard sounds are linked to the production of sounds. This is how infants implicitly learn to talk and sing. It is unthinkable that a pre-lingual infant should figure out how to produce a heard word or a melody. The learning of speech and music in infants requires direct coupling. Another example: The premotor area is linked to the vestibular cortex, which could be expected since the vestibular cortex gives feedback on acceleration, retardation and change of direction (zu Eulenburg et al., 2012). It may thus not be surprising, but still is, that vestibular stimulation (by moving a listener) influences the perception of rhythm (Phillips-Silver and Trainor, 2007). Here, motor structures and the vestibular system are reused for the perception of music. It is an effect caused by a reconfiguration of the network. This demonstrates that the pre-take of rhythm cannot be attributed to one brain area but to a pattern of reused functions. This pattern enables us to connect in collective rhythmic coordination. It may take various expressions such as rituals, dancing, playing, singing, hand clapping, marching to military music, working to works-songs or just waving a lighter at a concert. This coordination does not need a specific goal. However, it fulfills a universal need to connect with other people. The theme of synchronization and socialization will be developed further in the paragraph on empathy.

These examples of are just two out of a range of connections in a network activated by music. Endogenous network activity provides the context to perceive music as music rather than as unorganized sounds. Music is a play with faculties developed in ecology. In this respect, it exemplifies the Reuse Approach.

The Reuse Approach is an embodied approach in that it states that cognition cannot be separated from bodily activity "…action does not come after thinking, which comes after perceiving; thinking, perceiving, and acting are synchronous and co-determining" (Anderson, 2016).

To conclude:

1. As argued with the example of Pavlov's experiment, associative learning embodies declarative knowledge. All knowledge is embodied irrespective of if it concerns skills or symbolic knowledge.
2. Associative memory concerns the association of two elements. It could be considered the building block of sequences. This provides information of *what* will happen next in a chain of events. *When* (the timing of this event) is decided by motor planning activity providing an endogenous temporal chain of information. As can be concluded from the research of music, endogenous oscillatory activity provides an exact schema of pre-takes. Is this general? Does it apply to the perception of static art forms, such as paintings and sculptures? We will come back to this question.
3. The species-specific structure of the nervous system (DNA information), individually modulated by plasticity (perceptual leaning), pre-takes the work in a network of reused traces.

Contemporary enactive embodied theory implies a reorientation of traditional understanding of the brain. The pioneers in neuroscience investigated consequences of brain damage, leading to a segmentation of the brain into Brodmann's areas connected by neural pathways. The use of new techniques allowing for studies of the electrical activity in the brain provides evidence inspiring theoretical development. The trend in this development is the shift of research interest of areas communicating via neural pathways to synchronized patterns.

For the understanding of "context" in perception, this implies a reactivation of traces in a neural network paved by previous perceptions. Since these traces always entail motor activity and specifically motor planning activity, context is sequential. It is pre-taking.

This is the cognitive side of perception. Taking into account that cognition and emotion are reciprocally dependent, the inner state of the perceiver is an interaction of associations (activity in reused traces in the manifold of possible connections paved by plasticity) and emotion. This makes up the internal state of the perceiver and this whole state is contextual in any perception, including the perception of artistic artifacts or performances.

The state of the artist

"Aesthetics is for artists as ornithology is for the birds." Barnett Newman, American artist and founder of 'abstract expressionism, quoted by (Levinson, 2007).

If aesthetics has no relevance for the artist, what then is the perspective of the artist at the state of creation? The Swedish conductor Gunnar Eriksson, looking back on his life in music, claimed that artists continue to play for the rest of their lives.[1] Make-believe games are acts of imagination. Art is a game, although sometimes a serious one.

"Imagination is a guide to possibility" (Kind, 2005). It requires an actualization of knowledge—knowledge in the sense of "what" (the toys in the play) and the sense of "how" (the toys move and interact). Imagination is a mental simulation of a sequence of events. A memory called to mind is an imagination, but imaginations can be open ended. They are not always faithful to earlier experiences. They allow for new combinations in the play.

In a sequence, the next event is suggested by the sequence so far (as "pre-takes"). A sequence of neural events can be

1 https://www.youtube.com/watch?v=SRqqiSepLhY

perceived—envisioned, sensed or heard. This is called *imagery*—sensations, which do not have an external source. Imagery is a central aspect of imagination (McGinn and Mac Ginn, 2004). Since the word "imagination" means visualization, the concept implies that something is more or less obviously played up to the senses. Imagination and imagery are grades on the same scale.

Imagery is an important faculty in creativity. Taking a walk, you may start thinking about a recent situation, where you were insulted. You start arguing in your mind. You can hear the opponent talk back, and now you are involved in a dialogue. You act out the situation. Your lips may move. You may be gesturing. You perceive the exact sequence of words (and syllables). It is a chain of pre-takes. It is an "as-if" game. It is also an embryo to a scene in a play if you are a playwright. For a composer experiencing *musical imagery*, it just remains to put it down, record it, or simply play it. For the improvising musician, music imagery goes right into the instrument. It is already connected to motor sequences.

Musical imagery can be heard as anything from looped sequences to fully orchestrated music, perceived completely in all properties (Halpern, 2012). This elucidates how Beethoven could continue to compose, in spite of his loss of hearing. The research of the phenomenon provides insights concerning contextual embodied knowledge and perception. Musical imagery has been connected to activity in a network overlapping with the network for music perception, with the exception of the primary auditory cortex (Kraemer et al., 2005). It does however activate the auditory associative cortex.

Musical imagery is predictive (Zatorre et al., 1996). We can hear a continuance of interrupted music and even the beginning of the next song on a CD. Since this prediction does not have an external source, it is purely endogenous. Since it is predictive, it is contextual.

Amazingly, neural oscillations resonate not only with musical rhythms as demonstrated by the research of Large and associates but also with imagined rhythmic properties (Zoefel et al., 2018). Examples of imagined rhythms are the prediction of the next beat in music and the almost inevitable feel of meter (1/2; 3/4; 4/4; 6/8 etc.) in isochronous pulses such as the ticking of a clock, or our walking steps. Zoefel's finding demonstrates that imagination is directly connected to endogenous activity. Endogenous oscillations are also involved in the retrieval of learnt motor sequences (Pollok et al., 2015).

A role of endogenous oscillations was suggested by (Jones and Boltz, 1989), claiming that synchronization of endogenous and exogenous oscillations generate expectancies for future events, where endogenous oscillations designate brain oscillations and exogenous oscillations designate the musical soundwave. A row of studies confirm that such expectancies "enable attentional coordination with the environment" (Large et al., 2015). This is to say that the musician and the listener are coupled in a mutual pre-take. "Attentional coordination" is to experience music when played, in spite of neural delays.

The research of musical imagery demonstrates:

1. That, when the external music stops, the exogenously induced activity ends, but the predictive endogenous activity goes on and can be heard as imagery.
2. That, listeners have implicit knowledge concerning organizational principles of musical styles. Otherwise, the nervous system would not be able to produce music imagery. This means that we have *implicit models of music* creating "weak anticipations". These models are not stored as books on a shelf, but simulations of previous perceptions enabled by plasticity.
3. That, we can retrieve a load of tunes, replayed by the brain, and heard as imagery. These are thus, in this sense, *re-presentations*.
4. That, these "re-presentations" can be mental, since they can be heard (as music imagery).
5. That, these "re-presentations" are neural, since music imagery has no other source.
6. That, "attentional co-ordination" entails synchronization with the environment in perception-action. Endogenous oscillations and exogenous oscillations are synchronized. This is in accordance with ERP-research, with Dubois' understanding of synchronization as a pre-take, and with Neural Resonance Theory and research.

Musical imagery is a mental representation, since it is heard. This is not to say that mental representations are involved in perception, but that it is evidence of endogenous activity providing information for a pre-take.

This understanding deviates from "radical embodied cognitive science". Information may be picked up by the nervous system, much as the strings in a piano resonate to a voice singing into it. We must however take into account that this piano is also self-playing.

The mechanical activity of a self-playing piano is not music, but it is perceived as music. By the same token, endogenous brain activity is not music, but it can be perceived as music. This requires that endogenous activity "plays" on the sensory field. It has recently been demonstrated that the anticipation of a sound is a sensorimotor driven activation of auditory cortex (Gelding et al., 2019). Sensory field activation has also been reported for visual imagination (Slotnick et al., 2005). Wheeler et al., 2000 found that retrieving vivid visual and auditory information reactivates some of the same sensory regions initially activated in its perception. This has also been observed for spatial information (Persson and Nyberg, 2000). These studies suggest that the description of how neural activity can "play" on the sensory field and produce imaginations in the case of music, is general. It is not restricted to music.

All and all, the research of music demonstrates:

1. That, musical imagery is endogenous sequenced activity presenting pre-takes to the sensory field.
2. That, the brain can simulate music.
3. That, this simulation can be heard.
4. That the pre-take is mandatory in composing and playing. The continuance of the piece is continuously suggested to the composer as the sequence unfolds.
5. That the pre-take of the composer is soundwave of the composition.
6. That endogenous oscillations provide information without which music cannot be perceived as music. In this understanding, musicality is the ability to pre-take the next event in the flow of music.

There are two "streams" in the nervous system in the listener. One "stream" of sequenced oscillatory neural activity induced by exogenous soundwaves and another "stream" of sequenced endogenous oscillations, where the endogenous "stream" is a pre-take and thus contextual. Importantly, these streams are not streams along neural "pathways" from one brain area to another, but "streams" in the sense of sequenced oscillatory activity over time.

To conclude:

Since the music is a manifestation of a row of pre-takes, the beholder perceives the pre-takes of the artist. Since perception depends on pre-takes, the beholder pre-takes the pre-takes of the artist. Viewed as an information system encompassing the artist, the work of art and the beholder, this means that shared context leads to inter-brain synchronization. Pre-taken information is omnipresent in the system.

This implies:

1. That, the neurophysiological state of the artist at the point of creation is contingent of synchronous and co-determining activity in a network consisting of traces left by perceiving, modulated by, but also producing, emotions.
2. That, similarly, the neurophysiological state of the beholder at the point of perception is contingent of synchronous and co-determining activity in a network consisting of traces left by perceiving, modulated by, but also producing, emotions.
3. That the mental state in both cases corresponds to endogenous neural simulations "playing" on the sensory fields producing imaginations.
4. That the state in both cases is continuously changing.
5. That the correspondence of these imaginations depend on interbrain synchronization of endogenous simulations.

This paves the way for an understanding of art in terms of empathy—as shared internal states.

Aesthetic empathy

"Art is not a handicraft, it is a transmission of the feeling the artist has experienced" (Tolstoy, 1995). This formulation captures an understanding of art in just one sentence. It connects art to empathy.

Empathy has been defined as "…our ability to perceive both *that* as well as *what* another is thinking and feeling and to develop a felt response to these perceived thoughts and feelings" (Krueger, 2009). This definition is one of many, but it may serve as a starting point.

Empathy applied to art can be exemplified:

1. Empathy with the creator. We can feel the mood of a composer (e.g., Gustav Mahler's melancholic maelstrom in the Fifth Symphony).
2. Empathy with a performing artist: Watching a tightrope dancer, the German philosopher Theodor Lipps exclaimed: "*…Ich Fühle mich so in ihm*"(I feel myself in him) (Lipps, 1903). This can also be exemplified with audience reactions on Mick Jagger acting out "Satisfaction". "Empathy" is in fact an understatement of the explosion of sexual love and identification with raw models in teenage mass audiences at rock-concerts in the 60s. The spectators were sometimes so overwhelmed my compassion that they passed out.
3. Empathy with a depicted person, as expressed by the 15th century Italian architect Leon Alberti: "The painting will move the soul of the beholder when the people painted there each clearly shows the movement of his own soul...we weep with the weeping, laugh with the laughing, and grieve with the grieving. These movements of the soul are known from the movements of the body" (Alberti, 2005).

Empathy is a contested concept. We are faced with forty-three definitions (Cuff et al., 2016). The word "empathy" is a Latin-Anglicization of the German "Einfühlung"—the ability to feel in. "Einfühlung" was used by German philosophers in the late 19th century in the discussion of aesthetic experiences of artworks. Originally, this concerned how we project ourselves into the artwork and only later, the ability to feel into another person. Here, these two understandings will be combined.

I will present an enactive embodied understanding of empathy, entailing Anderson's "reuse" concept, Dubois" "strong and weak anticipation" concept and lead this to Chalmer's and Clark's "extended mind theory". As a point of departure, let us go to Edith Stein's phenomenological understanding of "empathy".

Edith Stein, a student of Edmund Husserl (the founder of phenomenology), regarded empathy as a *sharing of mental states*. In her pioneering seminal thesis *On the Problem of Empathy* (Stein, 1917), she draws on the concept of intersubjectivity, introduced by Husserl as "more than shared or mutual understanding and closer to the notion of the possibility of being in the place where the other is" (Duranti, 2010). This is perspective taking. The concepts of "shared mental states", "intersubjectivity" and "perspective taking" all reflect shared context.

The contemporary discourse on empathy involves numerous sub-concepts, summed up by (Batson, 2009, p. 3). This has led to a "multicomponential construct", inspired by Scherer's model of appraisal (Scherer, 2001). Appraisal theory claims that emotions are deduced from evaluations (appraisals or estimates) of events. This theory thus implies that emotions depend on inferences. Appraisal is often divided into several subcomponents such as conclusions from cues, intentional perspective taking and situation evaluation. This makes the theory of empathy akin to the *Theory of Mind* (Woodruff and Premack, 1978). Woodruff and Premack argued that empathy must be inferred from cues, since we do not have direct access to the mind of the other.

The meaning of empathy thus has changed from Stein's phenomenological *experience* of the mind of the other to multifaceted umbrella concepts involving conclusions resulting in an *understanding* of the mind of the other, leading to emotional reactions. Appraisal theory is a commonly accepted approach to emotion in psychological literature. This is reflected in articles, aiming to encircle what an aesthetic emotion is. For example, Menninghaus states that aesthetic emotions "always include an aesthetic evaluation/appreciation of the objects or events under consideration" (Menninghaus et al., 2019).

The general problem with the appraisal theory of emotion is not so much the involvement of cognition as the assumption that emotions are caused by a cognitive evaluation of a situation

and that emotions are inferred from cues. Shusterman reverses this assumption: "Evaluative outcomes are evoked through the emotions associated with the bodily and behavioral changes that occur during an interaction" (Shusterman, 2013).

In the case of music, it has been shown that "…music may recruit neural mechanisms similar to those previously associated with pleasant/unpleasant emotional states, but different from those underlying other components of music perception" (Blood et al., 1999). Peretz research on "amusics" shows that they have normal emotional reactions to music although they do not have conscious access to musical parameters (Peretz et al., 1998; Peretz, 2016). Both studies indicate that experienced emotions (feelings) in music listeners do not depend on conclusions from what we hear. As we have seen, there is a preconscious ERP-reaction, which precedes awareness.

What about literature? It would seem that this art form engages cognitive functions and that the emotions of the reader depend on the understanding of the fictional situation. Undoubtedly, but even this understanding is embodied. Reading ability depends on associative learning as argued above, where the symbol is associated to perception-action experiences.

The body has a "meaning generating role" (Colombetti, 2010). Colombetti states that this role has largely been disregarded by emotional science, which "tends to attribute this role only to separate abstract cognitive-evaluative processes". Such models, she says, "postulate a Cartesian brain operating on its own, distinct from the body" (i.e., computational theory). Colombetti refers to Antonio Damasio, who presented an understanding of emotion as "…an organismic process of self-regulation aimed at maintaining homeostasis. Emotion thus conceived also provides action-guiding values, drives and preferences" (Damasio, 1999). Colombetti concludes that sense making involves emotion. Embodied theory, she states, "is as much a theory of emotion as it is a theory of cognition". On these grounds, Colombetti is critical of the appraisal theory of emotion.

The view that we can share mental states, without reasoning, is gaining territory through a growing, widely branched body of research. This research is interrelated and the hypotheses and models are partly overlapping. It points to an automatic reciprocal connection between motor activity and emotion. This view does not deny cues, but concerns how cues are acted on (i.e., pre-consciously).

This research comprises:

1. *The facial feedback hypothesis* stating that our own facial expressions affects our emotions. This idea can be traced back to Charles Darwin's *The Expression of the Emotions in Man and Animals first* published in 1872 (Darwin and Prodger, 1998). The hypothesis has been widely tested. A recent meta-analysis of 138 studies confirms small but significant effects (Coles et al., 2019).
2. *Emotional contagion*—an idea developed by Elaine Hatfield. It concerns the tendency to automatically mimic "movements, expressions, postures and vocalizations with those of another person and consequently converge emotionally" (Hatfield et al., 1993). The research of mimicry demonstrates that we automatically mimic the expression of conspecifics and that this comprises motor as well as autonomic/physiological expressions (blushing, skin conductance, heart rate variability etc.) leading to a tendency of synchronization between interacting subjects. Connected to the facial feedback hypothesis, this leads to empathy through mimicry (Prochazkova and Kret, 2017).
3. *Rodent empathy* research demonstrating that that "rodents are capable of empathy, a process where the affective feelings of one are conveyed to another and then generate the same feelings in that individual" (Panksepp and Lahvis, 2011). Rodent empathy exemplifies that empathy does not require understanding, unless we have seriously underestimated the cognitive abilities of mice.
4. *The perception-action model of empathy,* which states that the perception of an emotional expression activates brain areas required to produce the same expression, which in turn elicits the adequate emotion in the beholder (Preston and De Waal, 2002). This model is inspired by the discovery of the mirror neuron system (Di Pellegrino et al., 1992).
5. *Mirror touch synesthesia.* "Watching another person being touched activates a similar neural circuit to actual touch and, for some people with "mirror- touch" synesthesia, can produce a felt tactile sensation on their own body" (Banissy and Ward, 2007). The authors show that the phenomenon correlates with heightened empathic ability and conclude that we "empathize with others through a process of simulation".

This research is commensurable with three crucial points, presented above:

1. The observation of an activity, activates the same sensorimotor network as when we perform the activity ourselves
2. This activity is pre-taken.
3. Motor activity is correlated with emotion.

Contemporary enactive embodied science displays a return to the original phenomenological understanding of empathy. This can be exemplified with Krueger's "extended, bodily skills–based view of empathy and intersubjectivity" drawing on *the* "extended mind thesis" (Krueger, 2009). This thesis, proposed by Clark and Chalmers, claims that cognition is extended outside the nervous system (Clark and Chalmers, 1998). Where information is picked up in the environment, the scull is not the limit. This idea connects with concepts of embodied theory such as Merleau-Ponty's *body-schema* (Merleau-Ponty, 1945) and Gibson's concept of *affordance*, since both include environmental features (instruments, which through habitual use become incorporated in the body schema, and action possibilities provided by the environment, respectively). Clark and Chalmers specify: "Mental states are (potentially) composed of neural, bodily, and, most controversially, worldly, properties—such as tools, artifacts, and technologies; language and other symbolic representations; environmental affordances; sociocultural institutions; and other minds" (Clark and Chalmers, 1998). As can be noted from this quote, artifacts (e.g., a work of art) and other minds (e.g., the artist) are components of the extended mind of the beholder. The extended mind theory does not dissolve the organism into the environment, since a living system is an *autopoietic* (Greek: self-created) and self-maintaining system, which defines its boundaries (F. G. Varela et al., 1974). Rather, this self-maintaining system is part of a larger cognitive system.

The extended mind is often exemplified with the cell phone. The phone performs cognitive functions such as navigation,

memory, communication, and calculation. Importantly, after some time, the user interacts with it automatically and directly. The thumb operating the phone has a life of its own. The knowledge of how to use the tool becomes embodied. If so, it does not matter whether the phone is inside or outside the scull. The same can be said about the tools in art. The brush of a painter, the guitar of a flamenco artist, the computer of an author serves after habituation as an extended part of the body and thus of cognition. They are parts of the *body schema*. Then, painting is just like visualizing; playing an instrument is just like singing; and typing is just like talking. As mentioned, imagery is an important capacity in art production. It engages sensorimotor functions. In the case of music, the sheet is often a transcription of musical imagery (i.e., the composer writes down internally heard music). The score contains information for the musician regarding the endogenous sequence in the composer. For the experienced musician, the score is sounding with music. This is a variant of music imagery. Just as the composer can hear her own endogenous brain activity, the musician can hear the endogenous activity of the composer by a look at the sheet. The music coming out of the orchestra is in this sense literally the extended mind of the composer in the act of creation. The orchestra sounds with sequenced endogenous activity. In the end, this is what the listener perceives (provided that the music is not calculated, as is often the case with atonal music). In most cases, composing involves imagination as well as calculation.

Extended cognition raises the question:

> *Can a work of art simultaneously be "extended cognition" of the artist and the beholder?*

Followed by the question:

> *Is "extended cognition" the key to aesthetic empathy?*

If so, art can be analyzed as an "extended cognitive system" encompassing the artist, the work, and the beholder. This gives the beholder access not just to the work, but to the mind of the artist, which is the ultimate understanding of the extended mind.

The Austrian phenomenologist Alfred Schütz farsightedly expressed this part taking in an essay contemplating music listening in the 50's:

> "Although separated by hundreds of years, [the listener] participates with quasi-simultaneity in [the composer's] stream of consciousness, by performing with him step by step the ongoing articulation of his musical thought. The beholder, thus, is united with the composer by a time dimension common to both." (Schütz, 1951).

Here, Schütz describes a mental synchronized *co-performance* of the artwork. He emphasized the shared time resulting in a unification with the artist. He calls it "quasi-simultaneity". It is a synchronization with an event hundreds of years ago, bridged by the note system or recording technology. The beholders of temporal art forms enact a sensorimotor script. This makes temporal art forms ritualistic (Vickhoff, 2020). This theme will be developed in the discussion.

Patterns of synchronization have been found from the simplest animal life forms to humans (Couzin, 2018). This omnipresence of synchronization supports Neural Resonance Theory (i.e., the nervous system obeys general physical laws of resonance). Synchronous activity has an impact on empathy assessed as prosocial behavior. In humans, studies demonstrate that synchronized movement positively affects affiliation (Kokal et al., 2011) as well as cooperation (Trainor and Cirelli, 2015). In a recent article called "Higher empathy is associated with stronger social bonding when moving together with music" (Stupacher et al., 2021), the authors accounts for a series of experiments enlightening the claim in the title. In connection with this, it is interesting to note that the administration of oxytocin—a peptide associated with empathic behavior, improves finger-tapping synchronization between a leader and a follower (Gebauer et al., 2016). Thus, the ability to synchronize seems to be connected to social interest. This can be associated with bird courtship, where the male and the female of some species engage in synchronized rituals, and even with human courtship, where the dance floor provides a scene for inter-personal synchronization. On a grand scale, as in the case of electronic music at rave parties, the whole floor resonates with the rhythm, resolving the limits between individual dancers. It is not you and me; it is *We*. It is an extension of cognition—a resonating system.

A recent article on empathy showed that…

> "…sharing a painful experience triggers emotional resonance between pairs of individuals through brain-to-brain synchronization of neuronal α-oscillations recorded over the sensorimotor cortex, and this emotional resonance further strengthens social bonds and motivates prosocial behavior within pairs of individuals" (Peng et al., 2021).

Interbrain synchronization requires parallel endogenous activity. Endogenous activation corresponds to imagination in the artist and to context in the beholder. As argued in the preceding paragraphs, context can be non-representative, representative, preconscious or conscious.

This suggest three levels of aesthetic empathy:

1. Pre-conscious non-representative endogenous activity (i.e., strong anticipation) matching exogenously induced activity (by sensory input from the work of art).
2. Pre-conscious representative endogenous activity (i.e., weak anticipation based on models) matching exogenously induced activity.
3. Awareness. The beholder experiences like-mindedness between herself and the artist.

It should be noted that it is just the third stage that approximately fits contemporary psychological definitions of empathy accounted for above. The first two are prerequisites to the third stage. All three involve emotion. In order to have an existential dimension (i.e., to mean something to our lives), art must evoke autobiographical memories providing a sense of who we are. As mentioned, the fact that the motor activity correlates with memories (Ianì, 2019), indicates that the motor sequence activates a network of reused traces. In behavioral terms, the sensorimotor sequence is a mnemonic to a variety of memories.

This entails three possible scenarios:

1. A mismatch of endogenous and exogenous information. This is the *prediction error,* requiring a reset of the endogenous sensorimotor sequence, which, as argued, actualizes new context.
2. If the artist and the beholder have the same sensorimotor information, the artwork is enacted. Brain functions evoked by the work of art result in synchronized exogenously induced activity and endogenous activity in the beholder, entailing synchronization between the artist and the beholder.
3. Sensorimotor information is shared, but autobiographical memories linked to sensorimotor activity are individual, since we follow different trajectories in life. We may however share autobiographical memories to a certain extent through similar cultural background.

To conclude:

Aesthetic empathy in terms of enactive embodied theory implies that the artist and the beholder enact the work of art and thus each other. They *pre-take* each other and *co-perform* the work. This adds a dynamical aspect to the understanding of empathy. Empathy is not just a shared internal state; it is a synchronization of a sequence of states. Empathy can be preconscious or conscious. If the artist and the beholder share *art-context* (e.g., the embodied knowledge of the style), we have a case of synchronized enactment of the work of art. The co-performance of sensorimotor sequences links to *non-art context* (e.g., autobiographical memories), which may be overlapping but not identical. There can never be complete aesthetic empathy. The non-overlapping space is Danto's *ellipsis*—the freedom of interpretation.

This understanding of aesthetic empathy corresponds to "extended mind theory". The cognitive system comprises the beholder, the artifact (the work of art), as well as the artist. Information is shared and synchronized in the system.

Next, I will apply this understanding in a conceptual framework of musical empathy. Generalizations to aesthetical empathy will be addressed.

A conceptual framework of musical empathy (and beyond...)

This framework is based on the findings presented to far. Since the evidence is biased toward the neuroscience of music, I will exemplify aesthetic empathy with the case of music. This will be followed of by a discussion of appliance to other art forms. The framework for musical empathy is introduced in three consecutive figures. Figure 1 shows structural coupling. Figure 2 shows coupling/mismatch in ERP-research. This leads to Figure 3, showing musical empathy as a system including the artist, the beholder and the music. Interbrain activity comprises cortical as well as subcortical activity correlating over time between music listeners resulting in consistent and reliable patterns of inter-individual time-locked brain activity (Abrams et al., 2013). The framework suggests that intra-synchronized networks are inter-synchronized at empathy. The concept of synchronization is used in a general sense (Pikovsky et al., 2001).

Resonance implies reciprocal modification of oscillatory activity. The oscillations in the auditory system are thus modified by endogenous oscillations. In behavioral terms, this is to say that anticipation modifies perception. On the other hand, exogenous oscillations modify endogenous oscillations. Resonance implies synchronization. The music is co-performed by the listener as a neural simulation. The music is enacted.

Structural coupling is indirectly demonstrated in ERP-research, since ERPs are reactions of the opposite (i.e. mismatches). This is shown in Figure 2. As long as there are no mismatches, the information is synchronized. At mismatches, the brain reacts. The prediction error reaction indicates desynchronization of the endogenous sequence and the exogenously induced sequence. The mismatch leads to a reset of the endogenous sequence—a re-synchronization. Analysis of ERP reaction times separates components of the potential as mismatches of "strong anticipations" (pure mismatch of information) from mismatches of "weak anticipations" (based on models). In addition, it separates preconscious from conscious reactions (experienced surprises).

The enactment in Figure 2 connects the beholder to music. The interesting event is the prediction error. The desynchronization of the sequenced variables triggers a reset of endogenous oscillation, which corresponds to new context. This context does not just concern the music, but also a new set of associated memories (e.g., the name of the performer, earlier encounters with the music etc.).

There are three couplings in music perception:

A. Synchronization between sequenced musical events and the Auditory Nerve sequence.
B. Intra-brain synchronization between the Auditory Nerve sequence and the sequence in reused traces.
C. Intra-brain synchronization binding reused traces to a synchronized network binding functional areas to coherent perceptions and memories.

These couplings lead to synchronization between the musician and the listener. The Auditory Nerve sequence is largely the same in both agents since they receive the same input from the music and have the same species-specific hearing structure. If the musician and the beholder have the same history of musical experiences, they have the same sequential pre-taking of musical events, leading to implicit or explicit synchronized co-performance of the music. This synchronization is a prerequisite for our ability to play together (Vickhoff, 2019). Figure 3 demonstrates how the preceding pictures lead to a synchronized, reciprocal and symmetric cognitive system—an extended cognitive system.

In the artist, a possibility of combined reused traces is presented to the mind as imagination/imagery. This is the vision she performs. It is already coupled to motor activity. The performance is a continuous inner "dialogue" between endogenously driven imagination and exogenous feedback from the work in progress, resulting in confirmations or prediction errors depending on her *skill* (precision in sensorimotor couplings).

In the beholder, the exogenous stream consists of the sensorimotor information in the work. For perception, this

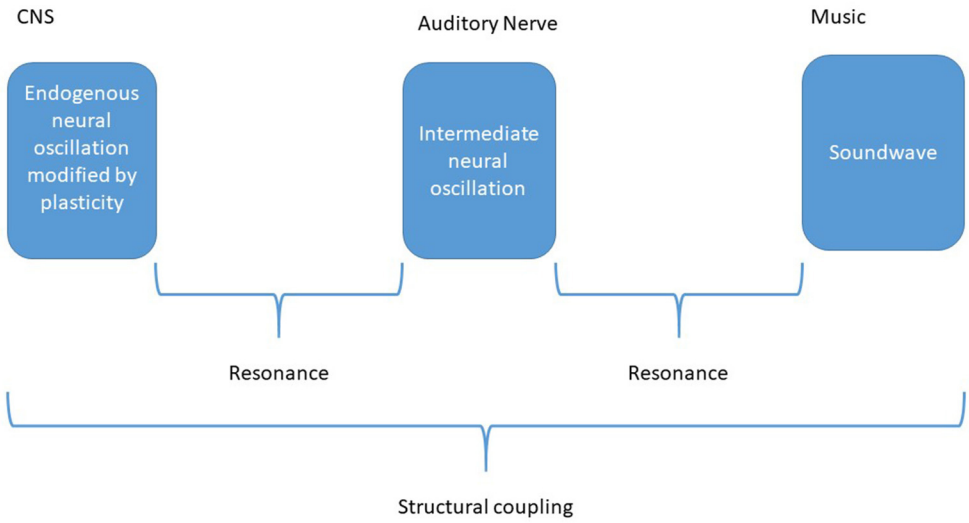

FIGURE 1
Structural coupling in music perception. The listener is structurally coupled to music *via* two steps of resonance. The structure of the soundwave is converted to electrical potentials in the cochlea and picked up by the auditory nerve by way of neural resonance. The structure of endogenous oscillations is immanent in reused motor-planning (sequenced) oscillatory traces. At music perception endogenous oscillations pre-take auditory nerve oscillation.

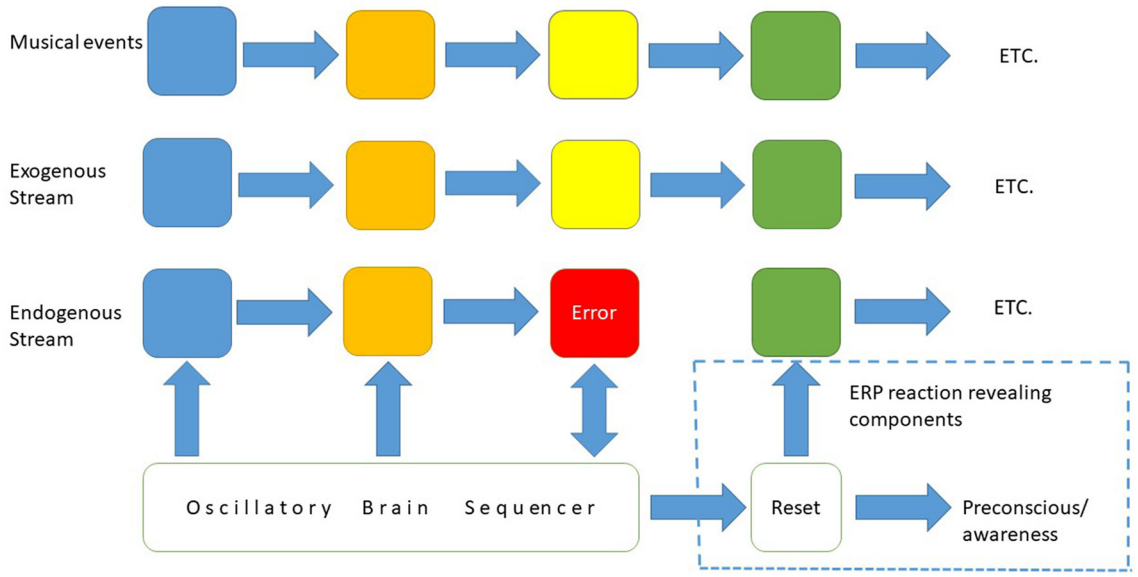

FIGURE 2
Musical enactment/mismatch. The figure shows interaction between the exogenously induced sequence (in the auditory nerve) and endogenous sequences pre-taking oscillations (presented in Figure 1). Matches in color signify structural coupling (matching information). The event (in red) is a mismatch (a desynchronization of sequences), detectable in ERP as the "prediction error". This implies a reset of the endogenous pre-taking sequence. ERP reaction times separate components in ERP potentials: reactions on strong anticipations from weak anticipations, and unattended mismatches from attended mismatches.

sequence must be related to context—the endogenous stream, consisting of congenital and reused endogenous activity.

Since the input from the work is virually the same for the artist and the beholder, similarities and differences in perception depend on similarities and differences in context. If exogenous and endogenous motor sequences match and correlate, the work is *co-performed* as a performance of the artist and as a simulation in the beholder. Correlated exogenous and endogenous sensorimotor sequences open a wider span of endogenous reused activities. In behavioral terms: correlated motor activity is a mnemonic to memories, providing an experience. Musical empathy is extended cognition, where the extended mind is just the surface.

Which are the prerequisites for generalizing this framework of musical empathy to other art forms? Music is special in

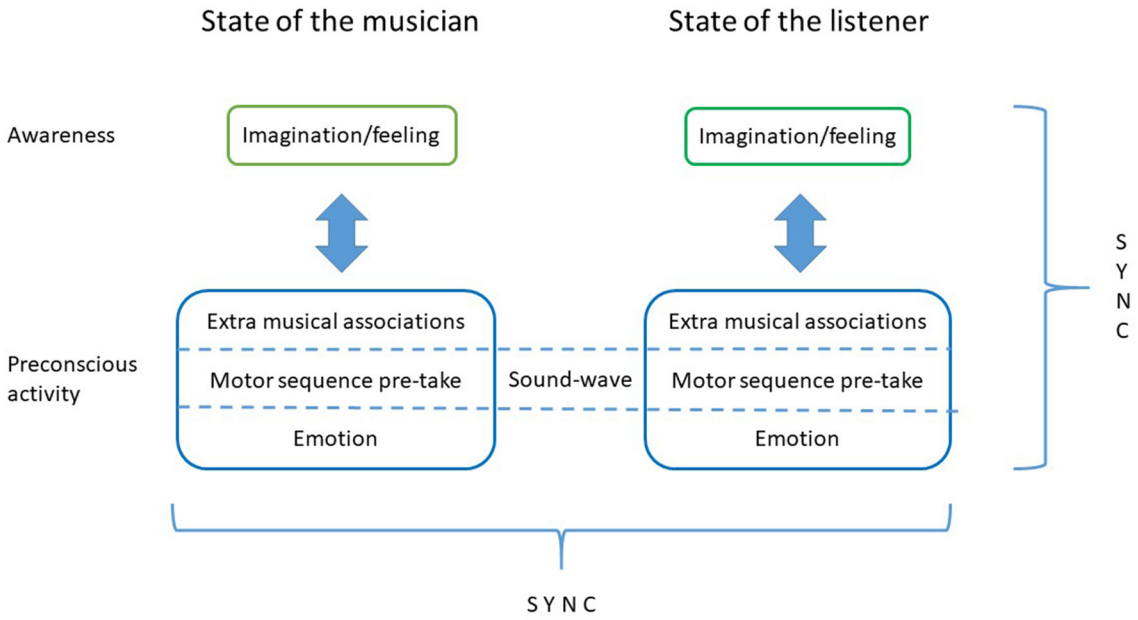

FIGURE 3
Musical empathy in an extended cognitive system. The musician and the listener both pre-take the music as it unfolds. It is a mutual enactment. Imagination is awareness of endogenously pre-taken music. The artist performs her neural simulation. The listener endogenously co-performs the work. The artist and the beholder are coupled. The motor sequence is associated with extra-musical memories as well as with emotion.

the pronounced synchronizing effect of rhythm. "…the auditory system is better suited to guide temporally precise behaviors like sensorimotor synchronization (SMS) than the visual system" (Comstock et al., 2018).

It should however be noticed that…

1. Enactment is a general consequence of perception-action, since perception-action is a basic unit in perception. This entails that perception always has a motor ingredient. So has contextual information (since it is re-activated perception).
2. Associative memory enables embodiment of symbolic presentations such as literature.
3. Strong and weak anticipation theory is generally applicable to biological systems.
4. ERPs are not limited to auditory violations; it has also been assessed for visual mismatches (Bernat et al., 2001).
5. The function of endogenous oscillatory activity is not limited to the perception of sound. Neural oscillations are also involved in visual, olfactory, motor perception systems (Bahmer and Gupta, 2018). For the visual system, it has been suggested that temporal coupling of neural activities is involved in the perception of size and continuity of spatial features (Neuenschwander and Singer, 1996). It has recently been proved for small animals that "visual selection is achieved by phase-controlled endogenous 20 to 30 Hz oscillations that lock onto temporal features of attended visual objects" (Grabowska et al., 2020). Concerning the motor system, it has been demonstrated that firing rates in medial prefrontal cortex correlates to hand and eye movements (Wang et al., 2018).

For these reasons, generalization to other temporal art forms is possible. Considering static art forms generalization is more problematic. It has been argued that is possible to feel the rhythm in paintings (Freedberg and Gallese, 2007). The authors exemplify with the works of Jackson Pollock, through simulation of sensed movements of the painter. For a nuanced understanding of this claim, see oppositional articles of Gaiger and Durà-Vilà (Gaiger, 2018; Durà-Vilà, 2019). In representational art, we do not need to go to such lengths. If, for example, a *stilleben* (still life) contains a glass of wine, we perceive that glass by earlier perception-action encounters with glasses. (grabbing them, drinking from them, the feel of holding them to our lips, and so forth). This actualizes the whole situation: the taste of wine, the color, the social experience, the emotion etc. Just as the tea-soaked madeleine cake in Proust's *Les Temps Perdu*, it re-presents the past. This concerns bodily activity required to perceive as well as bodily reactions coupled to emotions. In addition, emotional pictures affect the motor evoked potential, as mentioned above. It is also arguable that the beholder perceives the position of a depicted being as a section of a sequenced movement. If the motor sequence is known, we can feel the movement even if the depicted object does not move. If we, for example, know how to throw a discus, we may feel the movement in the *Discobolus of Myron*—the antique sculpture of a discus thrower.

There is however a more direct answer to the question of generality:

> *Perception is temporal, irrespective of if the work of art is temporal or not.*

Perception-action implies that perception always involves motor activity. Motor activity is sequenced over time. It follows that the *perception of all art forms is sequenced*. Viewing a painting or a sculpture, is to scan it with our eyes. This is to sequence the

perception, allowing for pre-takes. We can pre-take structures and colors in a painting as our gaze moves over the canvas, if we have learnt a model of the style. Static art forms unfold over time in the act of perception-action. The detection of an unstylistic element in a painting is an "event" (a mismatch). It is violating the pre-take. Would an unstylistic element in a painting be detectable as an ERP-reaction? So far, the design of ERP experiments on visual art perception involves presentation of a sequence of pictures (Else et al., 2015) with presentation times around one second for each picture. This is not ecologically valid. It is not how we perceive paintings. Rather, we contemplate the work as our gaze wanders over the painting.

It should however be noted that motor activity associated to scanning a work of art is not a co-performance of the work. This is an important difference between static and temporal art forms. This difference is critical for empathy, with negative implications for the therapeutic value of static art forms. These aspects will be discussed in the following.

Discussion

Why art? The main problem in The field of Art and Health is to state the role of the arts. The field is in need of a theory providing a definition of art in order to validate what is and what is not an art effect. The step taken here is to connect "context" in the philosophical concept "aesthetic contextualism" with embodied knowledge. In this conclusive discussion, I will connect the framework to psychosomatic health and suggest operationalization of key concepts.

In the presented framework, art is considered as the dynamics in a system involving the artist, the work of art and the beholder. In this system, art is a skilled manifestation of imagination, where imagination is a hypothetical possibility proposed to the senses by endogenous activity. The expression of imagination in a work of art demands skill. Skill does not just concern the production of art works; it also concerns the perception of art works. We need to know how to do something to imagine hypothetical actions. We need to know how to do something to recall ourselves doing it. We need to know how to do something to perceive the doings of others. The artist imagines. So does the beholder. The dynamics in the system depends on the correspondence of the internal states of the artist and the beholder, where states are endogenous activities corresponding to cognitive/emotional activity. This is analyzed in terms of empathy. Art, discussed at this level, concerns the synchronization/desynchronization of sequenced interbrain endogenous activity.

Desynchronization implies conflicting information—information, which does not fit into context (such as news and surprises). At complete desynchronization, the work of art does not resonate with our memories. At complete synchronization, the work resonates with our lives, but cannot add anything. We have heard it before; seen it before. Desynchronization can however lead to activity evoking new context. This corresponds to Danto's "ellipsis"—an empty space to be filled by contextual information. It adds something. It is a mind opener. This implies a change of the internal state of the beholder—a change of the "mindset"—to use a therapeutic term. The "mindset" is understood as a set of activated cognitive procedures in a preactional phase (Gollwitzer and Keller, 2016). I will develop this theme, and argue that the change of the mindset is an art effect and that this effect is relevant to heath.

The mismatch can be experienced as a surprise. The reset leads to an insight: "Oh, what happened now? What a move! This cannot be Charlie Parker; it must be John Coltrane." Or: "This cannot be Jonas Fisch; it must be Jackson Pollock." From there on, the beholder puts on her "Coltrane ears" or her "Pollock glasses". She "tunes in" to the style.

We abandoned the concept of beauty, as an aesthetic concept in the discussion of modernism, but there is a sense of beauty in the "aha"-feeling, when the reset of the contextual stream leads to re-synchronization and the unexpected suddenly fits into a new understanding. This can be experienced in enharmonic modulations (a tone is understood in a new harmonic context) and changes of accents in polyrhythms leading to a new understanding of the rhythm, which is a recurring element in jazz music. On a larger scale, it can be experienced in Messi's unexpected move opening the defense in soccer, in the unforeseen move in chess, leading to the fall of the king, and in Charlie Parker's return to harmony in a solo. Paradoxically, there is in this sense beauty even in Duchamp's fountain, if followed by the aha-experience when the work is connected to art context. However ugly the fountain may seem, there is an elegance in this.

Immanuel Kant labeled the aesthetic experience of awe "the sublime" (Kant, 1951). "Sublime" is Latin meaning "under the limit" (i.e., under the limit of the imaginable). It is a word for an overwhelming experience beyond comprehension. Kant's understanding of the sublime connects with Danto's and Levinson's contextual approach to art in the sense that art challenges presumptions. This art effect is therapeutically interesting, since it entails that the experience of art implies a change of the mindset of the patient. A profound art experience entails that we perceive the world in a new way. It can be operationalized, since desynchronization is biomarker of conflicting information. The framework suggests that the effect can be assessed as a leveling out of ERP indicating a reset of endogenous oscillation.

In three consecutive studies (Liu et al., 2021a,b,c), shed light over the interplay of the mindset, musically induced emotions and synchronization/desynchronization in coping with incongruent information.

These studies show:

1. That meditation (mindfulness) decreases negative emotions caused by sad music and promotes positive emotions of calm music.
2. That meditation improves the capacity to detect emotions in faces as well as in music. The authors found that this behavioral result was accompanied with a leveling out of ERP mismatch reactions to music and faces.
3. That coping with conflicting information, is facilitated by calm as well as happy music. Here, ERP mismatch reactions were stronger if the subjects had listened to sad music and leveled out by calm or happy music.

These findings demonstrate interdependences of meditation, music and conflicting information. The common factor is neural

oscillation. The connection between music and neural oscillation has already been accounted in the presentation of Neural Resonance Theory, as has the connection between mismatches and neural oscillation in ERP. When it comes to meditation, the EEC effects (as well as the ERP effect) is established (Cahn and Polich, 2006). This suggests that the interdependence is a resonance effect.

These studies demonstrate that meditation as well as calm and happy music facilitates the reset of endogenous activity. It makes us more flexible. Meditation as well as calm and happy music implies synchronization (because of the absence of mismatches). It improves the ability to cope with conflicts. As stated above with reference to (Cirelli et al., 2014), synchronization facilitates adaptation and cooperation. Taken together Liu's and Cirelli's studies underline the connection between behavioral aspects of empathy and the neurological aspect of synchronization. Synchronization with music implies synchronization with the artist performing the music. This is to say that empathy, can be operationalized as synchronized inter-brain activity measured with EEG hyper-scanning techniques allowing to follow performer/beholder dyads (Peng et al., 2021).

What is the implication to health? As claimed, mismatches are arousing. Several recent studies examine aspects of stress and desynchronization (Jena, 2015; Thome et al., 2017; Lebedeva et al., 2019; Tumati et al., 2021). This concerns inter-individual and intra-individual desynchronization, as well as desynchronization between the brain and the autonomous nervous system. Coping with conflicts is essential for stress management (Fothergill et al., 2004). The most obvious psychosomatic health issue is stress-induced illness. Stress is associated with a row of diseases, including mental illnesses (anxiety, depression, burn out), as well as any disease following from stress impaired immune systems (Morey et al., 2015). Stress is also associated with various heart problems (Stansfeld and Marmot, 2002). This concerns long-term stress, as well as acute stress. In the latter case, this is associated with the "Takotsubo Syndrome", sometimes tellingly referred to as "The Broken Heart Syndrome". This is a state reminding of a myocardial infarction. It is possible that desynchronization, long-term as well as acute, following from conflicting information, disturbs the fine-tuned oscillatory neural activity coordinating the activity of the heart.

To sum up: In temporal art, the performer, as well as the beholder, pre-takes the work leading to a synchronized or "quasi-simultaneous" (in Schütz's terminology) co-performance. The pre-takes are implicitly or explicitly acted out: *co-performed*. The motor component in this activity is linked to personal memories. This gives art an *existential dimension*. It resonates with our lives. Co-performed, art can affect us, just as any lived activity can. Life can affect us in any direction. It causes stress, calm, loss of self-confidence, pride, loneliness, togetherness, loss of meaning, new meaning, love, and despair, just to point out a few health relevant mental states. So can art. Surprising and overwhelming (sublime) experiences of art demand resynchronization—a reset of context—a new understanding.

When it comes to the question of operationalization of concepts, the presented framework suggests:

1. That the relation between the body and the mind in psychosomatic medicine can be assessed as intra-brain synchronization/desynchronization (since stress has been connected to desynchronization).
2. That art (as a system) can be studied as synchronized/desynchronized inter-brain activity measured with EEG hyper-scanning techniques allowing to follow performer/beholder dyads.
3. That the art effect can be operationalized as an ERP mismatch, followed by a leveling out of ERP), indicating resynchronization.

Why art? If the point with art therapy is physical activation through embodied perception, we need not go to art. We could just exercise. If the point is that art stimulates us the same way as life does, we do not need art. We should change our lifestyle.

There are five answers to this:

1. Art can be administrated to people who are impaired (who cannot exercise and who are restrained from everyday living due to physical inability, age, dementia, depression, loneliness, sickness, pandemics etc).
2. Art can be designed or selected to individualize therapeutic treatment.
3. The enaction of art can be administrated collectively, promoting shared experiences and social health.
4. The point is not to promote health by physical activation, but that the beholder lives the work of art with her whole being including cognition and emotion.
5. Art challenges presumptions and causes change. The art effect is existential. The challenge for the therapist is to make this happen.

I will use the remaining space of this discussion to expand on the existential dimension. The idea to bring about change by making people participate in a script of movements is traditionally practiced in rituals. The kinship between arts and rituals has been highlighted (Brown and Dissanayake, 2018). As the authors point out, the ritual has many art ingredients: masks, body decorations and insignia. More important, the ritual is a rule-governed sequence of actions and the practice is symbolistic (Brown, 1991). In a ritual, an idea, a fantasy is acted out by the participants following a script of actions. By the collective enactment (explicit or implicit co-performance) of the script, a shared belief system is conjured (since action and perception is a mutual dependency). It becomes lived and felt:

- It is not until the priest repeats "the words of Christ" in the communion and metaphorically serves the Savior's blood and body, that believers feel the presence of the divine.
- It is not until the priest spreads dust over the coffin and utters the very same words from generation to generation: *We therefore commit this body to the ground, earth to earth, ashes to ashes, dust to dust…* that we feel real grief. The exact script unites the mourners with their ancestors, mourning their deceased fathers and mothers, generation after generation. Our human experience and destiny—is synthesized, in the ritual. The pre-take of the ritual actualizes acute loss and acute helplessness.

- It is not until the winner in sports is standing on the podium, listening to the national anthem, that her (and perhaps our) tears start flowing.
- It is not until we sing Christmas carols together, that we feel Christmas in our hearts.

Brown and Dissanayake point out art elements in the ritual. This statement can be reversed: Temporal art has ritualistic elements. The participants pre-take a script of actions. Rituals have traditionally been used to change mental states, such as the conception of the self, and the conception of a life situation, and the conception of destiny. In traditional medicine, the priest and the medic is the same person, guiding individuals to change through the rite. The effect can be dramatic (Bell, 1990). The ritual is a bodily enactment of a shared belief—an imagination. Anderson's statement, "…thinking, perceiving, and acting are synchronous and co-determining" (Anderson, 2016), entails that action determines cognitive activity. I suggest that the enactment of an imagination in a ritual enforces the imagination into imagery—a perceived and lived imagination. This means that the enactment of a work of art, which is an enactment of the imagination of the artist, can change cognitive activity. A profound art experience can change the perspective of the beholder. It can change the mindset.

Why art? This article is the long answer. Condensed, the embodied enactive approach to art suggests:

1. Art is a meeting of imaginations. This meeting is an extended cognitive system comprising the artist, the work and the beholder.
2. Implicit or explicit co-performance (enactment) of the work of art can bring about a change of the mindset. Enacting a work of art is to assimilate the artist's view of life—her imagination.
3. Concerning health, we already know that the mindset is powerful, since the placebo effect is such a huge problem in the testing of new drugs. The force is strong enough to obscure the effect of any salable drug. Although this effect is well researched, it has been considered a confounding variable in medical research. The positive effect of the change of the mindset is beginning to attract attention with strategies such as "mindfulness", art therapy as well as combinations thereof.

To apply enactive embodiment in art therapy is a challenge for practicing therapists. Enactive embodied theory suggests:

1. *Contextual knowledge is crucial.* Art forms such as abstract art or atonal music has no effect if the patient is unfamiliar with the art form.
2. *Activity is more effective than inactivity.* The framework suggest activity aiming to bring about cognitive change. Explicit co-performance has stronger effects on cognition than implicit co-performance, since it requires a wider activation of motor networks and thus has a stronger impact on embodied memories. Dancing, playing music and choir singing should therefore be more effective than pure music listening. Dancing combines the emotional effect of music with explicit synchronization, socialization and physical exercise. Choir singing synchronizes the participants' explicit motor activity as well as physiological effectors coupled to the activity. The treatment of stress related disorders should not be floating in a dark water tank in order to relax (as has been practiced here and there to cure "burn-out"). This isolates the patient and leaves free space for kneading and anxiety. The choice is not even necessarily calm music. The research of Liu et al. provides a basis for testing happy music as well, since both types facilitate coping with conflicts. Furthermore, daily activity promotes nightly inactivity (sleep).
3. *Collective co-performance* of art leads to shared perspectives, which helps people to get out of personal kneading and anxiety. It initiates a change of perspective. A change from the own perspective, to a shared perspective. It is a possibility to experience that we are not alone with our problems—a possibility to distance ourselves from ourselves.
4. *Temporal art forms* invite collective participation leading to synchronization with the artist and other participants. This points to rhythmic entrainment and suggests that music or combinations with music such as music and respiration, choir singing, and dance should be considered. Music can be composed to guide slow and deep breathing in order to stimulate heart rate variability, which has a parasympathetic (i.e. soothing) effect (Grossman and Svebak, 1987). Singing has a similar effect since singing demands deep and slow respiration (Vickhoff et al., 2013). In choir singing, reported social health effects are not just caused by the fact that choir singing is a social activity. It is also synchronizing the participants at all levels, which has an empathetic social effect. Multimodal stimulation engages larger brain networks. This suggests combinations engaging several senses (e.g., music and moving pictures, music and drama, moving to music).
5. The cognitive-emotional-action interdependency, suggests that not just action, but also emotional interventions can be used in therapy. The fact that music affects people pre-consciously in terms of emotion enables the therapist to set a favorable (positive and relaxed) atmosphere for therapeutic treatment. As we have seen, this promotes coping with conflicts. In addition, it enables the therapist to associate cognitive information with positive feelings (e.g., music and lyrics; music and guided meditation).

Why is it, that people in western societies, so rich on the material side, do not feel well? Why is it, that we with our advanced medical care systems have alarming psychosomatic issues? Why is it, that our children have all these diagnoses, previously unheard of? The answer is not just the inflation of new diagnoses, but the rapid change in our culture. In the online society, we are constantly exposed to news, surprises and conflicts. It has irresistible advantages, but we are not adapted to it?

The reciprocal body-mind connection is well known in psychosomatic medicine. Still, it rarely appears to inform medical practice. In the hospital, we are still "a knee in room four", "a stomach in room six", or "a kidney in room three". De-individualized. Reduced to body parts.

Medical science is aware of this challenge. There is a need of new strategies. Art therapy is an interesting approach. Fancourt and Finn nail evidence of the art effect as the main issue of the field. This hypothesis article accounts for an enactive, embodied understanding of art, suggesting

operational definitions of key concepts, including of the art-effect. It points to neural synchronization/desynchronization as the link between the body and the mind. This gives the behavioral aspects of harmony and discord direct operational understandings.

To practice art therapy requires not just an evidence-based strategy; it also demands empathy, creativity, sensitivity, imagination, and skill. It is in itself an art form.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Acknowledgments

I am grateful to the topic editor Stephen Clift for valuable comments.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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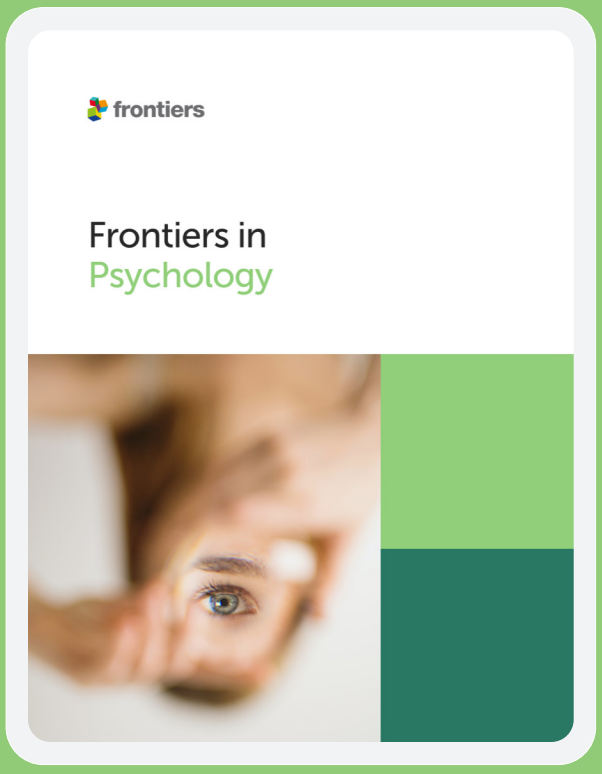

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