Social identity mapping in addiction recovery (SIM-AR): extension and application of a visual method

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Words: approx. 5580

Acknowledgements:

The authors would like to thank the managers, staff and participants who supported this research. This work was generously supported by the Australian Research Council under Grant DP140103579. The main author was supported by a PhD scholarship from the National Health & Medical Research Council (ID 1001144).

Abstract

Background: The Social Identity approach offers a unifying framework for understanding recovery from addiction as a process of identity change, associated with change in social network composition. This paper introduces Social Identity Mapping in Addiction Recovery (SIM-AR) — a visual method for capturing social group memberships, extended to integrate the substance use 'status' of group members as an indicator of group substance use norms. The aim here is to test theory-derived predictions focused on the relationship between changes in social identity and network composition reflected in substance use norms in early recovery.

Method: 155 therapeutic community (TC) residents in Victoria, Australia, completed the SIM-AR plus measures of substance-using and recovery identities and substance use shortly after admission, and 65% (N=101) again 6 months later.

Results: As predicted, substance use severity at follow up was associated with changes in both social identity and network composition. Furthermore, reduced strength of substance-using identity was associated with a decrease in the proportion of groups with heavy substance use norms, while increased strength of 'recovery' identity was associated with an increased proportion of non-using groups.

Conclusion: SIM-AR proved useful in testing predictions about social identity and network changes in a residential treatment context. It captured key social identity constructs in recovery using a visual technique with value to both research and applied contexts. Findings highlight the clinical importance of assessing a person's group-based relationships in treatment and early recovery, especially the influence of social group norms in relation to substance use.

Keywords: recovery, substance use, social identity, social networks, visual methods, mapping

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Introduction

The Social Identity Approach to Health (e.g. Haslam, Jetten, Postmes, Haslam, 2009; Jetten, Haslam & Haslam, 2012; Haslam, Jetten, Cruwys, Dingle & Haslam, 2018) offers a comprehensive framework for understanding the influence of social groups on general health and wellbeing. Applying this approach to recovery from alcohol and other drug addiction is the Social Identity Model of Recovery (SIMOR; Best, Beckwith, et al., 2016) which integrates two key factors supporting the recovery process – change in identity (e.g. Biernacki, 1986; McIntosh & McKeganey, 2000) and change in social network composition around substance use (e.g. Litt, Kadden, Kabela-Cormier & Petry, 2009; Longabaugh**,** Wirtz, Zweben & Stout, 2008; Haslam et al., 2018).

The main premise of the Social Identity Model of Recovery (SIMOR; Best, Beckwith et al, 2016) is that identity change in the recovery process is underpinned by moving away from groups in one's social network whose norms encourage heavy use and towards new or known groups whose norms and values are supportive of recovery goals. Drawing on Social Identity Theory (SIT; Tajfel & Turner, 1979) and Self-Categorisation Theory (SCT; Turner, Hogg, Oakes, Reicher & Wetherell, 1987), the social identity approach asserts that an important part of an individual's sense of self is derived from their membership of social groups. To the extent that membership of a group is meaningful, emotionally significant, and valued by an individual, key characteristics central to shared identity between group members are internalised as a part of the person's psychological self-concept. As part of the self, groups can influence members through transmission of, and encouraging adherence to, the group's norms, which come to be reflected in the person's behaviour, attitudes, values, and beliefs (Turner, 1991). Life transitions, such as recovery from addiction, typically involve changes in the group memberships that contribute to a person's self-concept (Jetten, Haslam, Iyer & Haslam, 2009). As a consequence, there is a change in the groups that function as sources of influence, support, and belonging.

One tool developed to examine the nature of an individual's network of social group memberships is Social Identity Mapping (SIM; Cruwys et al., 2016) – a visual method capturing the groups a person belongs to, and their relationship to those groups on various dimensions. To have meaningful application in addiction recovery research, the SIM tool has been adapted to include the substance use 'status' of group members, to reflect the changes in network composition found to support the recovery process (e.g. Groh, Olson, Jason, Davis & Ferrari, 2007), as well as groups norms that may influence substance use or support an individual's recovery efforts.

In this paper, we introduce this adaptation – referred to as Social Identity Mapping in Addiction Recovery (SIM-AR) – explaining the need for this tool with reference to the recovery literature. Through quantifying visual data from maps created by a treatment population from two Therapeutic Communities (TCs) in Australia, we examine the value of the SIM-AR tool in testing social identity theory informed predictions in the addiction recovery context.

Social Networks and Identity in Addiction Recovery

It is well established that the using status of a person's social network influences their own substance use. Treatment effects are sustained longer among those whose social network members do not engage in, or support, drinking (Litt et al., 2007, 2009; Longabaugh et al., 2008; Longabaugh, Wirtz, Zywiak & O'Malley, 2010). Even without treatment, people who maintain abstinence report a far greater reduction in substance use among their network membership (Buchanan & Latkin, 2008), both through the addition of new members who do not use substances and reductions in substance use among existing network members (Bohnert, Bradshaw & Latkin, 2009; Buchanan & Latkin, 2008; Rosenquist, Murabito, Fowler & Christakis, 2010; Zywiak et al, 2009).

In retrospective accounts of the recovery process, these network changes are described in terms of the 'type' of groups one associates with or distances oneself from, and what is 'normal' substance use behaviour for those groups (Best, Gow, Taylor, Knox & White, 2011; Best et al., 2010; Best et al., 2012; Biernacki, 1986; Granfield & Cloud, 1996). This is important as group associations have distinctive effects on wellbeing over and above the effect of individual relationships (Haslam, Cruwys & Haslam, 2014; Haslam, Cruwys, Milne, Kan & Haslam, 2015; Jetten et al., 2015), with social influence from individuals considered strongest when there is recognition of a shared group identity (Abrams, Wetherell, Cochrane, Hogg, & Turner, 1990; Turner, 1991).

Indeed, common to many of these retrospective accounts are reports of perceived changes in one's identity through the recovery process, away from an identity linked to substance use and towards an identity compatible with recovery (e.g., Best et al., 2011; Biernacki, 1986; Granfield & Cloud, 1996; McIntosh & McKeganey, 2001; Waldorf, 1983). Evidence from subsequent prospective studies provides strong support for these social identity changes as a key factor in both treatment outcomes and ongoing recovery (Beckwith, Best, Dingle, Perryman & Lubman, 2015; Buckingham, Frings & Albery, 2013; Dingle, Stark, Cruwys, & Best, 2015; Dingle et al, 2017).

No study has yet integrated these findings, likely due to limitations in the methods available to do so. It is for this purpose that we have adapted Social Identity Mapping (SIM; Cruwys et al., 2016), as explained below. This adaptation, SIM-AR, allows us to explore how changes in the composition of

one's group memberships and their substance use norms affect identity change in the process of recovery, as proposed in the Social Identity Model of Recovery (SIMOR; Best, Beckwith et al, 2016).

Social Identity Mapping in Addiction Recovery (SIM-AR)

Social Identity Mapping (SIM; Cruwys et al., 2016) is useful in understanding the nature of people's multiple social identities and confers a range of benefits in relation to the measurement of complex social identity constructs (Cruwys et al, 2016; Haslam, Dingle, Best, Mackenzie & Beckwith, 2017). SIM has been shown in clinical and non-clinical contexts to have good internal consistency as well as convergent and discriminant validity. Importantly it also identifies some key group processes that support health and wellbeing in a range of settings (Cruwys et al, 2016). In particular, multiple group memberships (reflected in group number), group importance (indicated by group size), group positivity (through ratings of how positive one feels about the group), and group compatibility (or the inter-relationships between groups as indicated in compatibility lines between pairs of groups) have been identified as key in protecting health and well-being in periods of life transition (Haslam et al., 2008; Jetten et al, 2009; Jetten, Haslam, Haslam, & Branscombe, 2009).

Social Identity Mapping in Addiction Recovery (SIM-AR) has a slightly different focus to the original SIM tool. Given SIM-AR builds on the existing structure of the SIM, it retains the capacity to explore the key social group processes related to wellbeing described above (see also Cruwys et al., 2016). However, SIM-AR adds another level of detail by capturing the relevant normative 'content' of each group's shared identity, substance use norms in particular. This adaptation was piloted with very small samples in addiction treatment settings (see Best et al., 2014; Mawson, Best, Beckwith, Dingle, & Lubman, 2015) and found to provide valuable data that was meaningful to participants. An example of a typical map, with its key elements, resulting from the SIM-AR process is shown in Figure 1.

INSERT FIGURE 1 ABOUT HERE

To capture groups' substance use norms, the person is asked to indicate the 'substance use status' of each group's members using classifications derived from an existing measure of network support for substance use — the Important People Drug & Alcohol interview (IPDA; Zywiak et al., 2009). Use of IPDA classification allows some comparison with previous research on substance using status within a person's network (e.g. Litt et al., 2009; Longabaugh et al., 2008; Longabaugh et al., 2010; Zywiak et al, 2009), as well as providing a guide for calculating key indices from group network data. In SIM-AR, group members' substance use status is indicated with coloured dots placed on the relevant group, as seen in Figure 1. Members could be classified as heavy (red dots), casual (yellow

dots), or non-users/drinkers (blue dots), or non-users/drinkers in recovery (green dots), with white dots where status is unknown. Particularly for groups with many members, dots were used to visually represent the proportion of group members for each relevant status, with group norms derived from the predominant substance use status in each group.

In the current study, as in the IPDA, group members' alcohol use (small dots) and other drug use (large dots) were captured separately. This avoids conflating the two, as shared norms around alcohol use compared to other substance use tend to vary due to differences in legal status and cultural acceptability in Australia. For example, it would be culturally normative for the majority of a group's members to regularly drink alcohol on social occasions but never use illicit substances.

In SIM-AR, groups can be categorised according to their substance use norms, indicating their influence on the person's substance use behaviour. We based our categorisation on scoring conventions developed for the IPDA (e.g. Groh et al., 2007; Longabaugh et al, 2010). As these were initially calculated based on an alcohol dependent population and did not include casual drinkers, we categorised groups by normative behaviour considered in the IPDA to be high risk (heavy drinking/use) or low risk (non-drinking/use or in recovery) for continued problematic use only. Thus, groups whose membership consisted primarily of heavy users (red dots) were categorised as *high risk* for the person, whereas groups whose membership comprised primarily non-users, people in recovery and/or members' whose substance use was unknown to the person (blue, green and white dots respectively) were categorised as *low risk* for continued problematic use.

While groups that did not fit the criteria for either low or high risk were not categorised further, they were still counted in each person's total number of groups. Consequently, in order to accurately index network composition for each person, the *proportion of high risk groups* and the *proportion of low risk groups,* was calculated relative to the total number of groups. These group network characteristics were then used in further analysis to test their importance in recovery.

The present study

Here we examine the value of SIM-AR as a research tool in the context of addiction recovery, using data from a multi-site longitudinal study – the Social Networks and Recovery study (SONAR; Best, Haslam, et al., 2016). The aim is to test key predictions regarding the role of social group processes in supporting recovery in line with a social identity approach.

First, we test the prediction that both changes in group network composition and social identities related to substance use and recovery will be related to substance use outcomes in the current

sample (Hypothesis 1; H1). We hypothesise that lower substance use at follow up will be associated with:

a. an decrease in strength of substance-using identity and a increase in the strength of recovery identity, and
b. an increase in the proportion of groups in a person's network categorised as 'low risk', and a decrease in the proportion of 'high risk' groups.

Second, we predict that change in substance-using and recovery identities will be associated with group-based network change in people's maps. Specifically, that an increase in proportion of high risk groups will be associated with an increase in substance-using identity, and an increase in proportion of low risk groups will be associated with an increase in recovery identity (H2).

Method

Participants and recruitment

Participants were 155 new residents of two Therapeutic Communities (TCs) in the state of Victoria, recruited with informed consent within the first four weeks following admission to the TC. Admission criteria for the TCs required residents to be at least 18 years of age and medically stable, with no clinical indicators of potential harm to self or others, or active psychosis. Staff of each TC further excluded potential participants on the basis of ill-health or behavioural management issues.

Participants ranged in age from 18 to 67 years (M = 35.1 years) and 66.5% were male. The majority (89.7%) were born in Australia, with 9.7% of Aboriginal or Torres Strait Islander descent. One third (34.0%) had previously been incarcerated, and 75% reported a mental health condition. While 90.9% of participants reported accessing at least one other type of treatment for their substance use in the six months prior to admission, two thirds (66.9%) had never accessed a TC program before. The primary drug of concern for 28.4% of participants was alcohol, with the majority (71.6%) seeking treatment for another drug, predominantly methamphetamine (34.2%) or heroin (23.2%). In their lifetime, 59.4% had ever injected a substance, with 39.4% using intravenously in the previous month.

Procedure and materials

Ethics approval for this arm of the Social Networks and Recovery (SONAR) study was obtained from the Eastern Health Human Research Ethics Committee. Participants were first interviewed within the first four weeks (M = 25 days) of TC admission and attempts were made to contact all participants for a follow up interview approximately six months post-admission. Of the original 155

respondents, 101 participants were contactable and available for a follow up interview, giving a follow up rate of 65.2%. Follow up interviews were conducted at the TC for the 38 participants still in treatment, and either at an agreed location or via telephone for the 63 participants who had left treatment.

The SONAR study procedure and interview schedule used is set out by Best, Haslam, and colleagues (2016), and included the administration of SIM-AR. To undertake the SIM-AR task (and create a map similar to that shown in Figure 1), the researcher provided participants with a large sheet of paper (A3 size), Post-It notes (three sizes), coloured dots (five colours, two sizes), and two coloured markers. After explaining the task, the researcher guided participants through the stages of the SIM-AR task in the following order: a) writing 'ME' in the middle of the A3 page, b) writing the names of each group on a separate Post-It note, with the size of the group (Post-It note) representing its importance, c) placing groups/Post-It notes on the A3 page around the word 'ME', d) adding coloured dots to each group to represent group members' substance use status, using small dots of alcohol use and large dots for other drug use, e) drawing lines to indicate group (in)compatibility - using a blue or black marker to draw straight lines indicating similarity between 'ME' and each group, and between the groups, then repeating this with a red marker and wavy or jagged lines to indicate conflict.

Maps remained de-identified, with researchers recording only the participant's alphanumeric identifier for the study. On average, the duration for administration of the complete SONAR interview schedule was around 90 minutes, of which between 10 and 30 minutes was spent on the SIM-AR task, depending on the number of groups and complexity of map content.

Measures

The following measures from the interview schedule for the SONAR study (see Best, Haslam, et al., 2016), captured at both time points, were used in this study to test predictions.

Substance use

Questions derived from the Australian Treatment Outcomes Profile (Ryan et al., 2014) asked participants to indicate which substances they had used in the previous six months, and the number of days they had used each of these substances in the previous four weeks. The *number of substances used*, and the *maximum number of days of use* of any substance in the previous four weeks, were used as indicators of substance use severity. At baseline, participants were asked to consider the four weeks prior to admission, with 'admission' defined as admission to an inpatient withdrawal unit where applicable.

Social Identification

To capture *substance-using identity* and *recovery identity*, the 4-item social identification scale of Buckingham and colleagues (2013; adapted from Doosje, Ellemers and Spears (1995) original scale), was used to gauge strength of identification as being 'in recovery' (α = 0.60; α [illegible]) and as being a 'drug user/drinker' (α = 0.80; α = 0.87); dependent on participants' self-identified primary treatment concern). Agreement with the four items from each scale (e.g., "I would describe myself as being in recovery", "I identify with other drug users/drinkers", respectively) was rated on a 7-point Likert scale where 1 = strongly disagree and 7 = strongly agree, with scores averaged for an overall score out of 7 for each identity type.

Social Identity Mapping for Addiction Recovery (SIM-AR)

The measures taken from the maps for this study were key indices of network composition – *proportion of high risk groups* and *proportion of low risk groups* in the participant's group network, for both alcohol use and drug use separately.

Analysis strategy

Spearman's rank-order correlations and Pearson's product-moment correlations were conducted, as appropriate, to assess relationships between social identity strength and substance use variables (H1a), the proportion of group risk types and substance use variables (H1b), and social identity strength and proportion of group risk types (H2). Correlations were first conducted on cross-sectional data at each time point to examine differences between time points in the pattern of correlations, then to assess the relationship between change in the proportion of group risk types and in strength of social identities, and between each of these change variables and substance use at follow up. Power analyses conducted in G*Power suggested that the study was powered to detect moderate to large effects ($r > 0.4$).

Results

All key variables had non-normal distributions at both time points, requiring use of non-parametric measures of central tendency and distribution, which are shown in Table 1.

INSERT TABLE 1 ABOUT HERE

The number of participants' social groups ranged from zero to six, with a median of four groups at both time points. Only 11.6% of participants specified six groups at baseline, while 5.2% reported no groups, and so did not produce a social identity map. At follow up, 15.8% specified six groups and 3.0% reported no groups. Although there was also little change in the median number of

both high risk and low risk groups in relation to alcohol use, there was a shift in the distribution of all group category type — toward zero for high risk groups and away from zero for low risk groups (see Figure 2).

A larger percentage of groups were not categorised as either high or low risk in terms of influence for heavy alcohol use (64.9% of all groups), when compared to other drug use (20.4% of groups), at baseline. This reduced to 50.0% compared with 21.7% respectively at follow up. The result was that around a quarter of participants had neither type of group in their network at baseline, dropping to 20% at follow up, however this did not exclude these participants or those groups from further analysis – it merely meant that the proportion of both high and low risk groups in the participant's network was zero.

INSERT FIGURE 2 ABOUT HERE

Participants' median strength of identification as a 'drug user' or 'drinker' at baseline (5.75 out of a possible 7) was only slightly higher than the median rating for strength of identification with being 'in recovery' (5.5 out of 7). At follow up, median identification as a drug user/drinker had reduced to 3.75 whereas identification as in recovery had not changed. Substance use had reduced significantly at follow up compared to baseline. Whereas, at baseline, the majority (74.8%) of participants were using at least one substance daily or almost daily, as expected, almost half (45.5%) of participants were abstinent from all substances at follow up, with only a quarter (24.8%) using at least one substance daily or almost daily. The number of different substances used by participants also decreased significantly ($Z = -5.56$, $p < .001$).

Cross-sectional associations between key variables

A nonparametric test of association (Spearman's rank-order correlation) between substance use, strength of identification with social identity categories, and network composition indices were calculated for baseline and follow-up data. As Table 2 shows, the pattern of association at these time points differed. At baseline, both the maximum number of days a participant used any substance and the number of substances used was associated with strength of substance-using identity but not with recovery identity. At follow up, however, both substance use variables were positively associated with substance-using identity and negatively associated with recovery identity as expected. In addition, the strength of these associations increased markedly between baseline and follow up, likely due to the greater variance in substance use frequency at follow up allowing for a clearer relationship to emerge.

INSERT TABLE 2 ABOUT HERE

A similar pattern was observed in network composition indices. At baseline, the number of substances used was correlated with the proportion of both high risk alcohol use and high risk drug use groups but only low risk drug use groups, while the maximum number of days any substance was used was only correlated with high risk alcohol use groups. Again, the picture was quite different at follow up, with moderate positive correlations between both substance use variables and both high risk group types, and negative associations between substance use variables and low risk group types. Again, the strength of association was markedly increased between baseline and follow up, particularly for low risk groups, and again likely due to greater variance in substance use frequency at follow up.

Finally, at baseline, identification as a 'drinker' or 'drug user' was positively correlated with the proportion of both high risk group types, as predicted, and negatively correlated with low risk drug use groups, whereas no group types were significantly correlated with recovery identity. Unlike previous results, the pattern was not markedly different at follow up, with similar effect sizes at both time points for relationships with substance-using identity. However, there was an increase in effect size for most relationships with recovery identity. The only exception to this pattern was that low risk alcohol groups were significantly correlated with both substance-using and recovery identity at follow up, but not at baseline, again with a notable increase in effect size.

Associations between changes in key variables

Correlational analysis was also used to assess relationships between the change in recovery and substance-using identities across the two time points, change in the proportion of high and low risk groups, and substance use outcomes at follow up. As change variables were normally distributed Pearson's product-moment correlations were conducted, although Spearman's rank-order correlation was used to assess relationships with substance use variables as these were not normally distributed.

Supporting Hypothesis 1a, less substance use at follow up was associated with an increase in strength of recovery identity, and more so with a decrease in strength of substance-using identity (see Table 3). Interestingly, there was no association (r = .009, p = .932) between change in substance-using identity and change in recovery identity.

Analysis also showed that changes in network composition were associated with substance use outcomes, supporting Hypothesis 1b (see Table 3). Specifically, an increase in the proportion of low

risk groups was significantly associated with less substance use at follow up. There was also a significant relationship between the reduction in high risk groups and less substance use, albeit not as strong.

INSERT TABLE 3 ABOUT HERE

Finally, changes in identification as a 'drug user' or 'drinker' were positively associated with change in the proportion of high risk groups in one's network, such that a reduction in a substance-using identity was accompanied by a reduction in the proportion of groups whose norms supported heavy use as predicted (H2, see Table 3). Further supporting this hypothesis, change in recovery identity was positively associated with change in the proportion of low risk groups in the network over a 6-month period, such that increased strength of recovery identity was associated with an increase in the proportion of groups in one's network where not using drugs or alcohol was normative.

Discussion

The aim of this study was to examine the value of Social Identity Mapping in Addiction Recovery (SIM-AR) in assessing changes in the composition of one's group memberships and their substance use norms, and the predicted impact on changes in social identity and substance use behaviour. Results show that SIM-AR is an effective tool for indicating social identity change in recovery, in line with predictions from the Social Identity Model of Recovery (SIMOR; Best, Beckwith, et al., 2016). In particular the results show that better substance use outcomes are related to a decreased substance-using identity and an increase in recovery identity, as well as a decrease in proportion of high risk groups and an increase in proportion of low risk groups in one's network. Importantly, change in recovery identity was positively related to changes in the proportion of low risk groups in one's network while change in substance-using identity was positively related to change in the proportion of high risk groups.

It was interesting to find that changes in substance-using and recovery identities were unrelated over a six month period, suggesting these are distinct processes, at least in these early stages of recovery. Nevertheless, both were associated with substance use outcomes, with substance-using identity more strongly related to substance use outcomes at this early stage. This may be due to the large decrease in strength of substance-using identity observed for the sample, whereas there was little to no change in recovery identity, despite nearly two thirds of the sample having left the TC at follow up. Importantly, these findings suggest that this is not necessarily a case of one identity diminishing as the other becomes stronger, as recovery is not simply a matter of

decreasing substance use or not using at all (e.g. Laudet, 2007; UK Drug Policy Commission, 2008; White, 2007). Integrating a new recovery identity into one's internalised network of group memberships requires not only relinquishing one's substance-using identity, but also assessing existing group memberships in relation to the emerging recovery identity (Jetten et al., 2009; Dingle, Stark et al., 2015; Dingle, Cruwys & Frings, 2015). Consequently, indexing the strength of one's recovery identity relative to one's substance-using identity is meaningful in terms of gauging identity change. Indeed, change in this differential has previously been shown to be a better predictor of recovery outcomes than change in either identity alone (Buckingham et al., 2013; Dingle, Stark et al., 2015; Dingle et al., 2017).

Still, to understand the mechanisms underlying these distinct identity change processes, it is first necessary to understand transitions in a person's network composition with regards to substance use, a key feature in recovery trajectories (e.g. Groh et al., 2007; Longabaugh et al., 2010; Buchanan & Latkin, 2008). Adaptations made to the SIM tool (Cruwys et al, 2016) to capture the substance use of group members allows us to gain these insights, with changes in substance-using and recovery identities underpinned by changes in the normative influence of groups in a person's social network.

These group-based network changes were also found to be associated with substance use outcomes, together suggesting they are a key indicator of identity change. Less substance use at follow up is related to an increased proportion of low risk groups and, to a lesser extent, a decreased proportion of high risk groups, consistent with previous findings regarding network support for substance use. Previous findings highlight the importance of introducing non-using network members (e.g Litt et al., 2009; Longabaugh et al., 2010) and groups (e.g. Best et al., 2012; Biernacki, 1986) to support recovery, with recovery-specific groups most beneficial for people embedded in a network largely supportive of heavy substance use (Groh, Jason & Keys, 2008). These non-using and recovery groups provide a positive source of social influence to reduce substance use (Bohnert et al., 2009; Rosenquist et al., 2010) through social learning processes and social control mechanisms (Frings, Collins, Long, Pinto & Albery, 2016; Moos, 2007), linking people with others in long-term recovery who can act as role models and helping embed new social norms around substance use to support recovery.

Our findings also illustrate the utility of SIM-AR as an ecologically valid means to capture complex information not easily indicated through existing quantitative measures. By applying substance use status categories derived from the IPDA (Zywiak et al., 2009) to an existing visual method of representing a network of multiple group memberships (SIM; Cruwys et al., 2016), Social

Identity Mapping in Addiction Recovery (SIM-AR) allows us to capture network support and normative influences for substance use at a social group level. This adaptation provides a significant and meaningful contribution to further understanding the social identity processes supporting recovery, primarily though its integration of social groups norms as a mechanism through which to understand substance use outcomes and identity change.

Results also reinforce that SIM-AR is of greatest empirical value when administered at multiple time points. Assessing change over time has great clinical value, as explored by Haslam and colleagues (2017) in preliminary case studies of SONAR study participants, with change in the number, type and importance of groups contributing to wellbeing and substance use outcomes. Mapping can be used to facilitate strategic decisions about social relationships, whilst highlighting complexities in doing so. For example, a group with heavy substance use norms may provide a person with valued social and emotional support, and for this reason the person may choose not to distance themselves entirely from that group. However, to support recovery goals, they will need to negotiate how they engage with members to minimise social influence around substance use. A SIM-based tool may also be used alongside community development practices to connect people with a broad range of recovery supportive groups where such supports are lacking in one's existing network (Best, Irving, Collinson, Andersson & Edwards, 2017). Changes can then be assessed by repeating the SIM-AR task in a therapeutic session, drawing comparisons with a previous map.

Finally, although the variety of measures that can be drawn from SIM-AR is a strength, particularly when used clinically, in a research context the time required to co-produce a map with each participant, and to code and analyse the data, may prove impractical in large scale studies. To this end, Cruwys and colleagues (2016) suggest consideration be given to time and the social identity data sought when designing a study. Where the focus is on a particular social category, such as 'drinker' and 'in recovery', a measure of strength of identification may be sufficient and more appropriate, as use of such measures have demonstrated significance in predicting a broad range of recovery outcomes (e.g. Buckingham et al., 2013; Dingle, Stark et al., 2015). However, SIM-AR is particularly appropriate where various social identity constructs or mechanisms underpinning social identity change in recovery are the focus of research.

Limitations

A number of limitations need to be considered. Although power analyses indicated that the sample size was only sufficient to detect moderate to large effects ($r > 0.4$), support was found for our hypotheses. Nevertheless, the sample size limits our capacity to engage in more detailed

analysis to address a number of study limitations. Firstly, 38 of the 101 participants followed up were still in a controlled, drug-free environment at this time thus inhibiting people's substance use and potentially influencing responses on measures of social identification. Correlational analyses are clearly insufficient to determine whether identity change reported was due to being in the drug-free environment of the TC. Nevertheless, what is significant is that changes in both identity and network composition were still related to substance use behaviour despite the difference in environments at follow up.

In terms of methodological limitations, our results are a reflection of the method used to categorise groups as high risk or low risk. The method used here was intended to replicate and apply, at a group-based level, the scoring conventions used in various iterations of the IPDA (Groh et al., 2007; Longabaugh et al, 2010). As results show significant associations for high risk and low risk alcohol and drug groups with both participants' substance use and identity change, this approach to categorisation appears meaningful in an addiction treatment context. In more general substance use research, however, a method for assessing the social influence of groups whose norms support casual use may need to be considered.

Conclusion and future directions

Using a visual approach broadens the scope of relevant data in the study of complex social factors supporting the process of recovery from addiction. These findings provide the first step in further developing the Social Identity Model of Recovery (SIMOR; Best, Beckwith et al., 2016), providing a practical tool with which to do so, and guiding use of SIM-AR in research and clinical settings.

Further research using SIM-AR can also extend these findings to assess the impact of other aspects of multiple group memberships found to support wellbeing more generally — such as group compatibility and group importance (e.g. Cruwys et al., 2016; Mawson et al., 2015) — as well as factors that may inhibit positive changes in network group memberships and identities, such as internalised stigma (e.g. Corrigan, Larson & Rüsch, 2009; Link, Cullen, Struening, Shrout & Dohrenwend, 1989). This will allow a more nuanced assessment of the Social identity Model of Recovery (SIMOR; Best, Beckwith, et al., 2016).

Beyond its research applications, SIM-AR holds great promise for further development as a clinical tool, providing a concrete method for addressing an abstract concept that holds intuitive appeal to participants. With increasing knowledge of social identity processes supporting both treatment outcomes and the recovery process more broadly, there is significant scope to embed

SIM-AR in a therapeutic program, with the standard SIM shown to be effective as the basis of general health-promoting interventions (Haslam, Cruwys, Haslam, Dingle & Chang, 2016). Given, the recognised benefits of using visual representations in therapeutic alliance and communication with a substance-using populations (Dansereau & Simpson, 2009), SIM-AR holds great promise as both an assessment and treatment planning tool. In the context of Therapeutic Community programs in which it was tested, it is recommended that Social Identity Mapping in Addiction Recovery be used throughout the program to explicitly address the process of identity change.

Declaration of interest:

The authors report no conflicts of interest.

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Figure 1: Example of a typical map created using the SIM-AR process

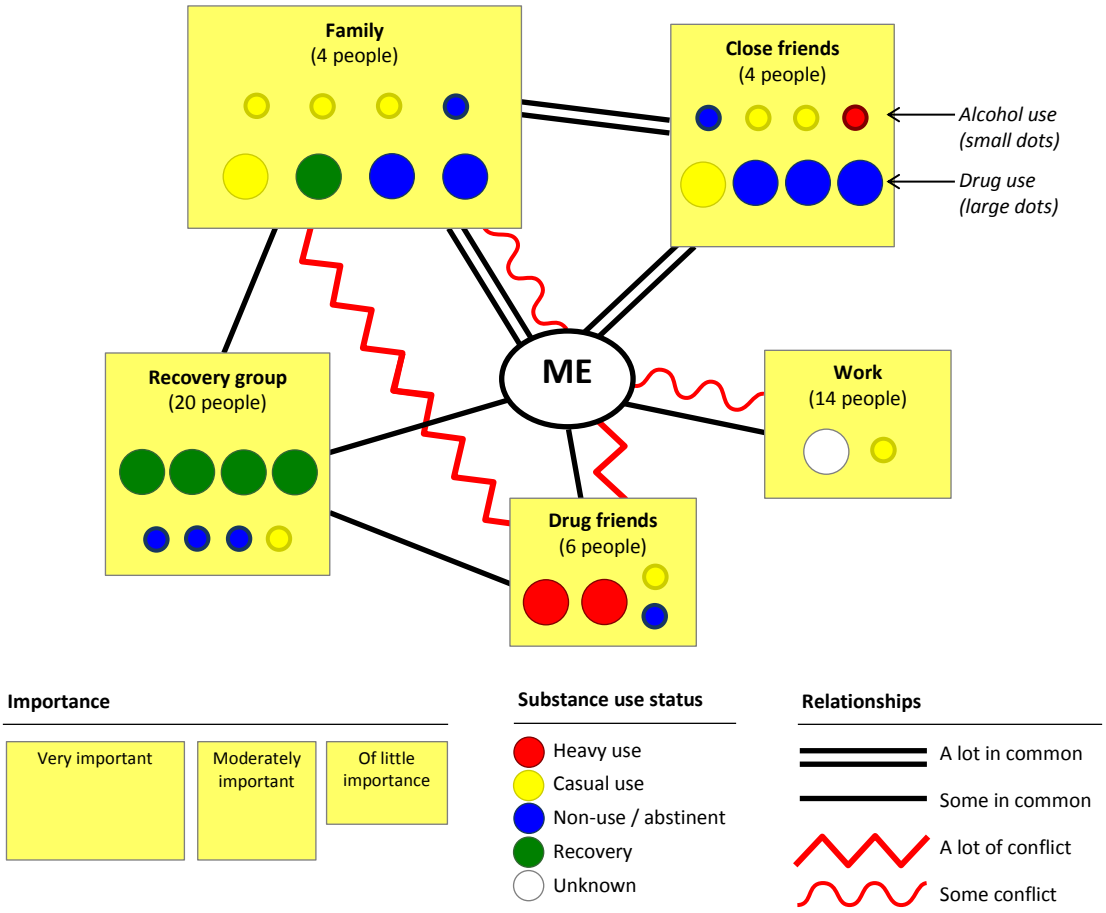

Table 1. Descriptive statistics for key variables at baseline and 6-month follow up

	Baseline (N = 155)		Follow up (N = 101)		
	Median	**IQR**	**Median**	**IQR**	**Significance of difference**
GROUPS IN NETWORK					
Total groups	4	2 - 5	4	3 - 5	*NS*
High risk groups (alcohol)	0	0 - 1	0	0 - 0	*p* =.001
High risk groups (drugs)	1	0 - 2	0	0 - 0	*p* <.001
Low risk groups (alcohol)	1	0 - 1	1	0 - 2.25	*p* <.001
Low risk groups (drugs)	2	1 - 3	3	2 - 4	*p* <.001
SOCIAL IDENTIFICATION					
'Drinker' or 'drug user'	5.75	4.5 - 6.5	3.75	2.25 - 6.0	*p* <.001
'In recovery'	5.5	5.0 - 6.25	5.5	4.75 - 6.25	*NS*
SUBSTANCE USE (last 28 days)					
Number of substances used	3	1 - 4	1	0 - 3	*p* <.001
Maximum days any substance used	28	20 - 28	3	0 - 25.5	*p* <.001

Figure 2. Distribution of number of groups by risk type at baseline and follow up

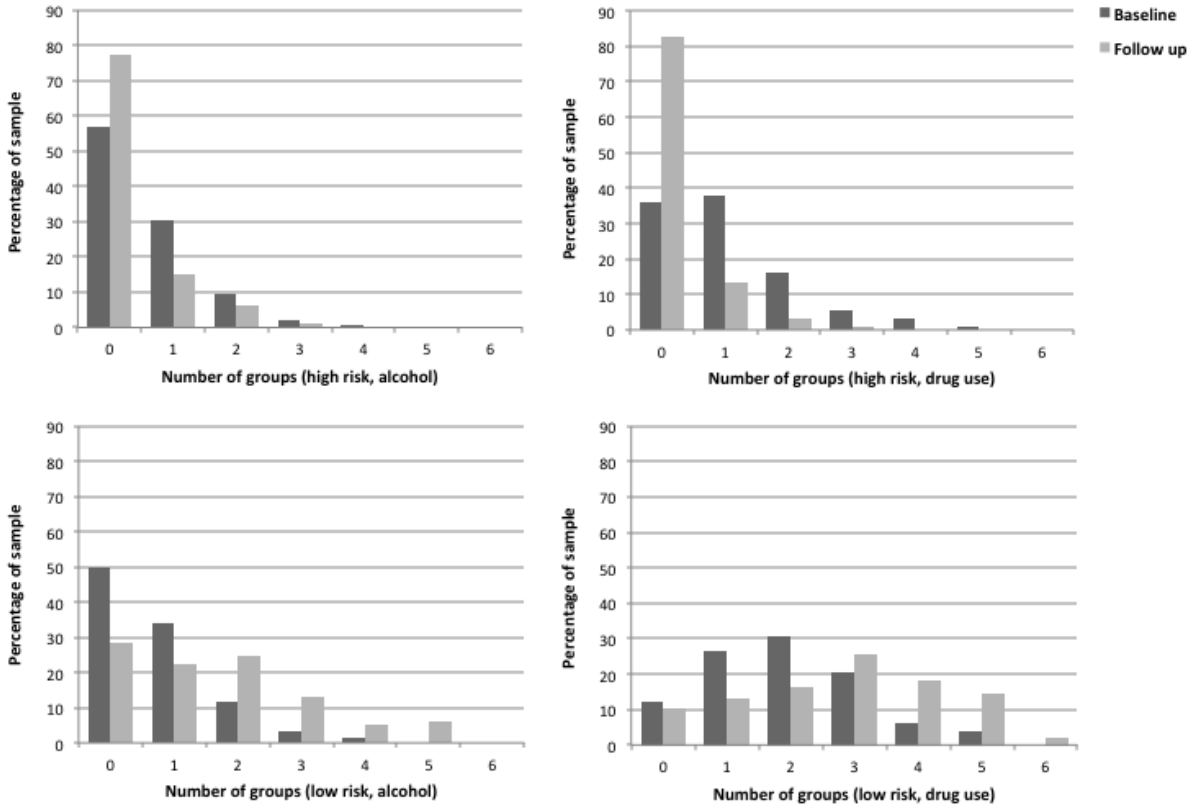

Table 2. Cross-sectional correlations between group-based network support for substance use, social identification, and substance use severity at baseline (T1), and 6-month follow up (T2)

	Number of substances used	Max days used any substance	User/Drinker Identity Score	Recovery Identity Score
T1 - CROSS-SECTIONAL				
User/Drinker Identity Score	.273**	.232**		
Recovery Identity Score	.003	.055		
% HIGH risk groups ALCOHOL	.216**	.184*	.242**	-.109
% HIGH risk groups DRUG USE	.295**	.085	.241**	-.056
% LOW risk groups ALCOHOL	-.135	.033	-.116	.085
% LOW risk groups DRUG USE	-.280**	-.069	-.309**	.065
T2 - CROSS-SECTIONAL				
User/Drinker Identity Score	.492**	.453**		
Recovery Identity Score	-.290**	-.289**		
% HIGH risk groups ALCOHOL	.363**	.367**	.291**	-.043
% HIGH risk groups DRUG USE	.440**	.241*	.232*	-.112
% LOW risk groups ALCOHOL	-.529**	-.549**	-.206*	.260**
% LOW risk groups DRUG USE	-.422**	-.393**	-.295**	.126

Correlation coefficients are based on non-parametric associations (Spearman's rho)
*** p < 0.01*
** p < 0.05*

Table 3. Correlations between change in group-based network support for substance use, change in social identification, and substance use at follow up

CHANGE	Number of substances used at follow up	Max days any substance used at follow up	Change in User/Drinker Identification	Change in Recovery Identification
	(*Spearman's rho*)		(*Pearson's r*)	
Change in User/Drinker Identification	.425**	.407**		
Change in Recovery Identification	-.318**	-.294**	.009	
Change in % HIGH risk groups ALCOHOL	.246*	.260*	.273**	-.263*
Change in % HIGH risk groups DRUGS	.213*	.134	.244*	-.110
Change in % LOW risk groups ALCOHOL	-.415**	-.423**	-.078	.224*
Change in % LOW risk groups DRUGS	-.364**	-.322**	-.291**	.238*

*** p < 0.01*
** p < 0.05*