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Exploration of the Factors Influencing Attitudes to Breastfeeding in Public

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Abstract

Background: Negative attitudes towards breastfeeding in public have consistently been identified as a key barrier to breastfeeding continuation. In order to design effective social marketing campaigns to improve public attitude towards breastfeeding in public, it is critical to identify segments of the population who are less likely to support this activity, their underlying reasons and the medium through which they can be reached.

Research aim/question(s): The aims were to identify the underlying dimensions that drive acceptance or opposition to breastfeeding in public; test whether specific population segments were more or less likely to support breastfeeding in public and identify suitable media outlets to reach them.

Methods: A cross-sectional survey testing agreement with 60 statements was administered online between May 2016 and May 2017 and was completed by 7190 respondents. Exploratory Factor Analysis was used to identify 12 dimensions driving acceptance or opposition to breastfeeding in public. The influence of demographics and media consumption on attitudes towards breastfeeding in public was tested using Welch's *t*-tests and one-way analyses of variance (ANOVA).

Results: Acceptance of breastfeeding in public was found to differ with gender, age, religion, parental and breastfeeding status, but not household income. Support for breastfeeding in public also varied with media consumption habits.

Conclusion(s): This work lays the foundation to design effective social marketing campaigns aimed at increasing public support for breastfeeding in public.

Background

The embarrassment that mothers can experience when breastfeeding in public has consistently been identified as a key barrier to breastfeeding continuation (Boyer, 2018). This embarrassment is very likely to be at least partially derived from the stigma, a socially created issue, attached to breastfeeding (Chopel et al., 2019). Indeed, although the underlying reasons may differ throughout the world, resistance to breastfeeding in public is pervasive. It has been estimated that only 65% of Chinese participants felt it was acceptable to breastfeed in public (Zhao, Ouyang, & Redding, 2017). In Canada, 75% of participants agreed that breastfeeding in restaurants and shopping malls was acceptable (Russell & Ali, 2017) and in the United States, 50% of participants were not supportive of breastfeeding in public (Mulready-Ward & Hackett, 2014). Recently, 26% of participants in Ghana disagreed that breastfeeding should be allowed in all public places (Coomson & Aryeetey, 2018). In Serbia, support for breastfeeding in public is also low (Buturović, Ignjatović & Rašević, 2017) but there is surprisingly no data available, as yet, for the UK.

This social disapproval is keenly felt by breastfeeding mothers (Owens, Carter, Nordham, & Ford, 2018). Recently those views have been made disproportionately visible through highly publicized events, which arguably contribute to mothers' feelings of unease and embarrassment when breastfeeding in public (Komninou, Fallon, Halford, & Harrold, 2017) but also reinforces negative attitudes towards breastfeeding in public (Grant, 2016a; Grant, 2016b). A number of scholars have convincingly argued that improving breastfeeding rates and supporting mothers who wish to breastfeed is a collective responsibility and more should be done to promote public support for breastfeeding in public and challenge social norms (Grant, 2016a; Tomori, Palmquist & Quinn, 2017). Shifting normative beliefs and improving attitudes towards breastfeeding in public can contribute to that agenda and both social marketing campaigns and norm based interventions could be effective tools (Miller &

Prentice, 2016). In order to design effective social marketing campaigns, the message needs to be adapted to address genuine concerns of the target population. Moreover, suitable channels need to be identified to reach them.

The underlying reasons behind opposition to breastfeeding in public have been described in a number of recent qualitative studies (Morris, de la Fuente, Williams, & Hirst, 2016; Taut, 2017). They range from the sexualisation of the breast to disgust at what is perceived as bodily fluids but also normative beliefs about how "others" may perceive breastfeeding in public and breastfeeding etiquette. However, so far, there has been little attempt to understand the relative importance of these dimensions. This information is likely to be critical in shaping suitable messages aimed at increasing support for breastfeeding in public.

There have been conflicting reports of who is more or less likely to support breastfeeding; in particular, gender, age, religion, education and household income have all come under some scrutiny. The discrepancies observed may be explained by different cultural factors because those studies were conducted in different countries. Men have been found to be more supportive of breastfeeding in public than women (Russell & Ali, 2017) although not systematically (Mulready-Ward & Hackett, 2014). Similarly, older members of the public have been found to be less supportive of breastfeeding in public (Mulready-Ward & Hackett, 2014) although this was not always confirmed (Russell & Ali, 2017). There are also conflicting results with respect to parental status (having children at home), which was shown to be positively associated with support for breastfeeding in public (Lippitt, Masterson, Sierra, Davis, & White, 2014; Russell & Ali, 2017) or not (Mulready-Ward & Hackett, 2014), whereas lower education attainment has consistently been associated with less supportive attitudes (Mulready-Ward & Hackett, 2014; Russell & Ali, 2017). The extent of support for breastfeeding within specific religions has also been investigated showing that in general, members of religious faiths are more likely to initiate breastfeeding and Muslims

tend to breastfeed for longer and are generally supportive of breastfeeding (Kamoun & Spatz, 2018; Rayment, McCourt, Vaughan, Christie, & Trenchard-Mabere, 2016). When comparing to Protestantism and Catholicism, a negative correlation was observed between Catholicism and breastfeeding initiation rates (Bernard, Cohen, & Kramer, 2016). However, the views on breastfeeding in public within different faiths remain unexplored.

The role of mass media on public opinion in the context of infant feeding has been highlighted with an emphasis on how it could shape what is viewed as the norm (Brown, 2017; Foss & Blake, 2018; Tomori, et al., 2017). In this respect, social media and the online comments on news items have proved a useful source of information to get an overview of stated reasons to support or oppose breastfeeding in public but they have also highlighted seemingly different levels of support and attitudes by media type in the UK (Grant, 2016a; Grant, 2016b; Morris et al., 2016). This is, however, only emerging evidence and a more systematic and broader understanding of the media consumption habits of members of the public who are opposed to breastfeeding in public constitutes a unique opportunity to target them more effectively.

Although less than optimum breastfeeding rates are a global phenomenon; they are particularly low in the UK. In 2018, the average breastfeeding prevalence in England was 46% at 6-8 weeks with large variations (23% to 79%) between local authorities (Public Health England, 2019a). In this context, it is critical to understand the underlying reasons driving opposition or support for breastfeeding in public and their relative importance (aim 1). However, in order to design successful social marketing campaigns, it is also vital to characterize the population segments that are more likely to oppose breastfeeding in public (aim 2) and identify medium through which they can be reached (aim 3). Identifying key features for successful social marketing campaigns is of international interest.

Methods

Design: This study was observational in nature, with a cross-sectional study design in which the data were acquired through a self-report online survey. This type of study is relatively inexpensive and enables the simultaneous assessment of multiple outcomes (Thiese, 2014). Ethical approval was obtained from the Faculty Research Ethics Committee of Sheffield Business School, Sheffield Hallam University (SBS-104).

Setting: Maternity leave in the UK is made up of 26 weeks of ordinary maternity leave and 26 weeks of additional maternity leave (Maternity pay and leave, 2019). The Equality Act from 2010 makes it unlawful to discriminate against breastfeeding mothers. Breastfeeding help and support is available through the National Health Service (NHS) through midwives and health visitors but also volunteer mothers (NHS, 2016). Despite this, breastfeeding rates in England fall short of the World Health Organization (WHO) recommendations. For quarter 3 of 2018/19, breastfeeding prevalence and exclusive breastfeeding rates in England were at 46.0% and 31.6% respectively; in our local authority (Yorkshire and the Humber), breastfeeding prevalence and exclusive breastfeeding were somewhat lower than the national averages at 40.3% and 28.5% (Public Health England, 2019b).

Sample: Inclusion criteria: The target population was UK members of the public. Exclusion criteria: being less than 18 years of age; having lived in the UK for less than 2 years. A convenience sampling method was used; the survey was advertised through radio programs (BBC Radio Sheffield and Hallam FM) with links to the online survey posted on the radio websites. A broad, heterogeneous self-selected sample of 7190 was obtained. After eliminating questionnaires not meeting the inclusion criteria, a total of 7085 valid responses were obtained.

Measurement: The survey was created for the purpose of this study. The themes and items were grounded in existing literature around attitudes towards breastfeeding in public (Morris et al., 2016). Participants were asked to score 60 attitude items on 7 point scales ranging from strongly disagree to strongly agree. Examples of items are "I believe that women are likely to feel exposed and vulnerable when breastfeeding in public" and "I believe that breastfeeding mothers enjoy making a show of it in public"; the full list of items is available as supplemental material. Respondents were also asked demographic questions related to age, gender, nationality (with time lived in the UK for non-British respondents), children (if so, whether they had been breastfed and for how long), education attainment, religion affiliation and household income were also included. Finally, the frequency with which participants engaged with a range of media was recorded.

Data collection: Background information (aim, inclusion and exclusion criteria as well as how the data were going to be used) was presented at the start of the survey. Moreover, members of the public accessing the survey link were informed that "Taking part in this survey is entirely anonymous and voluntary. You do not have to take part and your answers will only be recorded when you press 'submit' at the end of the survey". Completing and submitting the survey was taken as informed consent. The survey was designed and distributed using Google forms and remained open from May 2016 to May 2017. The first author was responsible for moving the data from google forms into SPSS. In order to keep the data secured and participant confidentiality maintained, the dataset and all information pertaining to the study were stored on an intranet folder with controlled access (authors only) in accordance with the institution research data management policy.

Data analysis:

Demographics: The frequency for each category was expressed as a percentage of total sample and compared to recent demographic information for the UK (Table 1).

Aim 1: Participants' ratings on 60 observed attitudinal variables were subjected to factor analysis to identify relevant dimensions in the data. Items were excluded from the analysis if they loaded on factors below 0.3 and had less than 0.10 difference in loadings between two or more factors (Tabachnick & Fidell, 2007). The number of factors to be retained was determined by minimum eigenvalues of 1; visual examination of the scree plot and the results of a Monte Carlo parallel analysis using raw data permutation using Castellán's (1992) BRMIC, 24, 72-77 algorithm (O'Connor, 2000; Watkins, 2008); eighteen variables were removed from the analysis. Promax rotation was employed to allow for factors to be inter-correlated (Matsunaga, 2010; Stewart & Zack, 2008) because oblique rotation more appropriately reflects reality for most social science constructs (Costello & Osborne, 2005). Dimensions were labelled on the basis of a thematic analysis of items loading on each factor. An ordinary least squares (OLS) regression analysis was then used to identify the dimensions that significantly predicted participant attitudes (at $p < 0.01$) to both: 1) 'It is always acceptable to breastfeed in public'; and 2) 'It is never acceptable to breastfeed in public'. All significant dimensions were retained in the two regression models. Additionally, the variables 'People are sexually aroused by BF in public' and 'I am sexually aroused by BF in public' were included in the analysis because of their low communality (< 0.2) i.e. $> 80\%$ unique variance in the factor analysis and because they are aligned with the general discourse around breast feeding in public. The first variable was found to have a significant influence on the dependent variable (DV): 'Breastfeeding is always acceptable in public' and was therefore retained in the model.

Aims 2 and 3: The influence of participant demographics and behavior on the attitudes towards breastfeeding in public dimensions (factor scores) was then assessed using Welch's t -

tests and Games-Howell multiple comparison procedures for the one-way ANOVAs to allow for unequal variances based on modifications to the degrees of freedom. Participants' ratings on the agreement/disagreement scale relating to the critical dependent variable: 'It is always acceptable to breastfeed in public' were used to identify pro- and anti-breastfeeding in public groups. From the overall sample, the neutral / pro-breastfeeding in public (PBFP) group numbered 6756 while the anti-breastfeeding in public (ABFP) group was significantly smaller at 329. Given that the differences between the groups may reflect true differences in the population, experimental weighting measures were avoided in favor of taking a random sample ($n = 329$) from the PBFG group to provide equal sample sizes for the analysis.

All the analysis described in this section as well as the Bartlett's test of sphericity, the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy, the parallel analysis using the Monte Carlo simulation and Cronbach's reliability alphas were performed using SPSS Version 22 (IBM Corp., 2013).

Results

Aim 1: Underlying reasons driving opposition or support for breastfeeding in public and their relative importance

The exploratory factor analysis (EFA) produced 12 factors that represent the dimensions of attitudes towards breastfeeding in public. They accounted for 68.3% of the variance in the data before rotation (Table 2). Bartlett's test of sphericity, the KMO test of sampling adequacy, the parallel analysis using the Monte Carlo simulation and Cronbach's reliability alphas indicated that the outcome was reliable. Additionally, composite construct reliability (CCR) was greater than 0.7 for each dimension, and construct validity (convergent and discriminant validity) were also established. All items loaded significantly on their constructs and the average variance extracted (AVE) was greater than 0.5 (with the exception of

dimensions 3 and 11) indicating that the specific measurement variables were generally sufficient in their representation of the constructs (Hair, Anderson, Tatham, & Black, 2009). The moderate or strong correlations between items loading on the same constructs also showed evidence of convergent validity. To assess the discriminant validity, the AVE in each construct was compared to the square of the correlation coefficients between the constructs (Fornell and Larcker, 1981). For each of the 12 dimensions, the AVE was greater than the square of the correlation coefficients, thereby confirming discriminant validity. It is interesting that five of the dimensions (1, 2, 5, 10, 11) represented positive aspects of breastfeeding in public, whereas seven (3, 4, 6, 7, 8, 9, 12) represented negative facets.

Model 1 in Table 3 shows that nine predictors had a significant influence on 'Breastfeeding is always acceptable in public'. While the positive influence of dimensions 1 and 2 were predictable, dimension 12 was interesting because it showed an understanding of the breastfeeding mothers' point of view. Four of the dimensions with negative influence were unsurprising, but the negative influence of dimensions 5 and 8 were interesting and showed that being comfortable with women breastfeeding around them (dimension 5) was not a prerequisite to acceptance whilst believing that women breastfeeding in public may feel vulnerable (dimension 8) was likely to decrease acceptance of breastfeeding in public. These two elements indicated that empathy for breastfeeding mothers and understanding of their point of view had a direct impact on acceptance of breastfeeding in public.

Model 2 shows the 10 dimensions that significantly influence 'Breastfeeding is never acceptable in public'. The belief that mothers who breastfeed in public are self-absorbed and inconsiderate and that breastfeeding is disgusting had a positive influence on opposition to breastfeeding in public. By comparison, many of the dimensions with a negative impact reflected an understanding of the perspective of breastfeeding mothers.

When comparing models 1 and 2, nine dimensions were strongly ($p < 0.001$) associated with acceptance and/or opposition to breastfeeding in public. Three of those dimensions related to the breastfeeding mothers' social interactions ('mothers who breastfeed in public feel uncomfortable and vulnerable'; 'social exclusion of breastfeeding mothers' and 'mothers who breastfeed in public are self-absorbed and inconsiderate'). Other influential dimensions of interest were 'normative beliefs about breastfeeding in public' and 'breastfeeding in public is disgusting'.

Aim 2: Population segments more likely to oppose breastfeeding in public

Table 4 shows the demographic variables that are statistically significant moderators for 1) participants' agreement/ disagreement with the statement: 'It is always acceptable to breastfeed in public'; 2) the 12 dimensions of attitudes to breastfeeding in public; and 3) two variables with low communality (< 0.2) i.e. $>80\%$ unique variance (Child, 2006): 'I am sexually aroused by BF in public' and 'People are sexually aroused by BF in public'.

Opinion about breastfeeding in public always being acceptable was differentiated on the basis of a number of demographic variables, including gender; higher levels of support were found among females compared with males. Moreover, opinions varied by both age and religion; agreement with breastfeeding in public decreased with age, particularly among the over 40s, and was also lower among those with a religious affiliation compared with participants who have 'no religion', rather than being differentiated on the basis of a particular faith. By comparison, opinion was not differentiated on the basis of education or household income. There was also a higher level of support among participants with children, those who had breastfed their children and those who breastfed in public, but interestingly, not for those who were currently breastfeeding at the time of the survey. Agreement with breastfeeding in public always being acceptable also increased with duration of breastfeeding. It was notable

that 68.5% of participants with no children disagreed with breastfeeding in public. Moreover, 66.7% of participants whose children were not breastfed also disagreed as did 82% of those who did not breastfeed their children in public, whereas 63.9% of those who did, agreed as did 69.7% of those who breastfed for over 12 months, compared with 69.6% disagreement among those who breastfed for between 2 and 6 weeks.

As with the overall acceptability of breastfeeding in public, there were significant differences on the 12 dimensions of attitudes to breastfeeding in public in relation to demographic and behavioral variables. There was disagreement on the basis of gender on 11 dimensions. Males disagreed while females agreed with the five positive dimensions whereas opinions were reversed on six of the seven negative dimensions. The pattern was also consistent in relation to age: On eight of the dimensions, older participants (particularly those over 40), disagreed with the positive and agreed with the negative dimensions. While opinion about acceptance of breastfeeding in public overall was undifferentiated on the basis of education, it was significant for five of the dimensions; agreement with positive dimensions and disagreement with negative dimensions generally increased with increasing levels of education. Participant religion was a significant moderator of opinion about seven of the dimensions. As with attitudes to breastfeeding in general, there were differences between religious and non-religious participants: The former tended to agree with the negative dimensions and disagree with the positive dimensions while the situation was reversed for those with 'no religion'. Significant differences on six dimensions were also found in relation to household income; generally there was agreement with the positive and disagreement with the negative dimensions as income increased. Agreement with the positive dimensions and disagreement with the negative dimensions also increased significantly with the duration of breastfeeding.

Aim 3: Medium through which segments of population opposed to breastfeeding in public can be reached

Participants' opinion about the acceptability of breastfeeding in public was also differentiated on the basis of their media usage (Table 5). For example, there was a higher level of opposition to breastfeeding in public among those who read the Daily Mail or Daily Telegraph on a daily basis compared with those who read either less frequently or never. By contrast, there was a higher level of acceptance among those who read the Guardian, Independent or who either listen to or watch radio or television news more frequently. This was also the case for those who watch comedy shows and chat shows more frequently. Participants' agreement/disagreement on the dimensions of attitudes to breastfeeding in public was also differentiated in terms of their media usage. For example, participants who read the Daily Mail every day disagreed with the positive dimensions and agreed with the negative dimensions more than those who never read the newspaper. By contrast, daily and weekly Guardian readers agreed with four positive dimensions and disagreed with negative two dimensions more than those who never read this newspaper.

Discussion

Some dimensions which proved particularly influential with respect to acceptance or opposition to breastfeeding in public could lend themselves to practical social marketing interventions designed to increase acceptance of breastfeeding in public. Three of the dimensions related to the mothers' social interactions and reflect how breastfeeding mothers are perceived, with empathy or through the inconvenience they cause. This truly illustrates how breastfeeding can shed light on human relationships and how it is part and parcel of our social and cultural environment (Tomori, et al., 2017). However, this suggests that raising awareness of the social exclusion breastfeeding mothers may experience and encouraging

members of the public to view the issues from their point of view may be an effective way to promote acceptance of breastfeeding in public. Messages could be developed to show how widely accepted the practice is, in an attempt to align outlying views with the majority of opinion and social norms in this context (Elgaaied-Gambier, Monnot, & Reniou, 2018). This is particularly relevant as one of the influential dimensions associated with acceptance of breastfeeding in public was 'normative beliefs about breastfeeding in public'. We know that shaping behavior change in public health contexts is highly complex, often requiring shifts in norms and attitudes in order to support the desired behavior (Kelly & Barker, 2016). Marketing campaigns developed to target the wider cultural context and prevailing social norms, may help to bring about needed change in the unsupportive opinions and behaviors that implicitly act to regulate breastfeeding in public. While the evidence paints a mixed picture, there are a number of cases where social norms based marketing campaigns have been used to leverage significant changes in behavior amongst targeted groups across a range of public health and social issue contexts, including drinking, smoking and energy use, with impressive results (Stok, Verkooijen, & Renner, 2018). Accordingly, this approach could be implemented to effect positive change in norms and behaviors in this context.

Another dimension strongly associated with opposition to breastfeeding in public was 'breastfeeding in public is disgusting'. This is reminiscent of the strong negative views elicited by other breastfeeding practices, for example, milk sharing (Tomori, Palmquist & Dowling, 2016; Tomori, et al., 2017) and which reflect a broader disgust and distrust in human milk (Van Esterik, 2002). Whilst difficult in practice, repositioning brand image and company reputation is a key function of marketing in the commercial sector (Gaustad, Samuelsen, Warlop & Fitzsimons, 2019; Keller, 1999), which could prove effective in shifting negative public perceptions and attitudes in this context. The 'Got Milk' campaign for instance, which was developed for the California Milk Processor Board, is one example

amongst many, of how a strategically focused image based marketing intervention is able to transform deeply embedded associations held in consumer memory about a product and turnaround falling sales (Holt, 2002). In a highly competitive market that was being shaped and disrupted by carbonated beverage manufacturers this sustained campaign successfully transformed milk's bland and boring image to one of being cool, up to date and relevant. While brand strategies are yet to gain widespread use and acceptance amongst health professionals and across public health initiatives more generally (Evans, Blitstein, Vallone & Nielsen, 2014), the case for adopting branding as a central approach to achieving long term sustainable behavior change in the context of breastfeeding in public ought to be considered and discussed. Although presently inconclusive, evidence from a number of public health campaigns targeting a range of issues including teenage smoking and drinking, diet and exercise, and drug taking, is beginning to show that branding health behaviors and their associated lifestyles can achieve positive results and effect desirable changes amongst targeted groups (Vallone, et al., 2017). These two themes (empathy for breastfeeding mothers and changing the image of human milk) represent potential avenues around which marketing campaigns and interventions could be developed to increase acceptance of breastfeeding in public. Taken together, they may contribute to closing the widening conceptual gap between the desirable product of breastfeeding and the act of breastfeeding (Tomori, et al., 2017) and lessen mothers' concerns about propriety and the need to distance themselves from immodest breastfeeding behaviors (Van Esterik, 2002). It is of interest that, in line with previous qualitative data (Morris et al., 2016), the 'sexualisation of the breast', which has been put forward as a key factor to explain opposition to breastfeeding in public (Tomori, et al., 2017), was not as influential in this setting as the perceived attitude of breastfeeding mothers or the disgust instilled by human milk.

It may be tempting to view acceptance as decreasing with an increasing conceptual distance between one's situation and the act of breastfeeding as males, older members of the public, members of the public who did not have children were all more likely to oppose breastfeeding in public. However, this is not supported by the results in as much as participants currently breastfeeding a child were not more likely to be supportive of breastfeeding in public than those who did not. It is interesting to note that despite important cultural differences between the countries in which studies on attitudes towards breastfeeding in public were based (for example, diverse legislation or maternity leave entitlement); the trends with respect to demographics proved reasonably consistent. In this respect, understanding the relative importance of underlying reasons to oppose breastfeeding in public is of international relevance.

Although it is impossible to know whether media consumption influences attitudes or whether media merely reflect attitudes, the emerging evidence that users of different media hold diverging views on the topic of breastfeeding in public (Morris et al., 2016) has been confirmed. It is interesting to note that there is a strong overlap between the demographics of the readership of newspapers associated with more negative views of breastfeeding in public like the Daily Mail (Pamco, 2018) and those identified in this survey as being more likely to object to breastfeeding in public. Considering how media has been found to shape norms overtime (Humphreys & Thompson, 2014; Humphreys, 2014), a better understanding of which media to target with appropriate social marketing campaigns could prove decisive to design stigma reduction interventions.

Building on these findings, future research in the UK should focus on developing social marketing campaigns aiming at increasing empathy for breastfeeding women and / or improving the image of human milk. Those may be grounded in norm based interventions as there was strong evidence that normative beliefs played an important role in acceptance or

opposition to breastfeeding in public. Those campaigns should be piloted with segments of the population more likely to oppose breastfeeding in public and any successful campaign could be rolled out through the appropriate media to reach the target audience. More broadly, there is a critical need for further studies based outside the Western world to shed a genuine global light on the topic.

Limitations

The key limitations of this study relate to the sampling method and the sample. We are making the point that there exists differences in attitudes towards breastfeeding by media usage and our sampling method relied on reaching members of the public through two local radio programs including BBC radio Sheffield. Our results show that frequent viewers of BBC news programs tend to be more accepting of breastfeeding in public; there is thus the possibility that the program disproportionately reached members of the public who are more supportive of breastfeeding in public. This may have been counterbalanced by reaching a different population group through Hallam FM but there is insufficient information to test this. Taking part in the online survey may also have been made more difficult for members of the public with no access to or little experience of computers or the internet. Moreover, while cross-sectional in nature and designed to capture respondent heterogeneity, when compared to the UK as a whole, some segments of the population are underrepresented (males, people aged between 18-24 and 65-74, Hindus and Muslims, as well as individuals of lower educational attainment) while others are overrepresented (the highly qualified, females and people aged between 30-39). In explanation, the sample was self-selecting and would have therefore attracted participants who felt strongly one way or another about breastfeeding in public. This being the case, future research could seek to target participants who more accurately reflect the UK population to enhance generalizability of the results. Also, there was no way of controlling for participants responding twice; this is a known difficulty of

questionnaires collecting anonymized data. Additionally, many of the results show bivariate comparisons only, with no adjusted analyses. With these issues in mind, we have been very careful not to over-interpret the results and not to make broad generalizations about the level of support or opposition to breastfeeding in public in the UK. More critically, the sample is large enough to model support (or lack of) for breastfeeding in public and extract valuable information about factors that influence this. Finally, the trends observed with respect to demographics largely confirm those reported for other countries and provide reassurance that the conclusions are reliable.

Conclusions

Potential avenues to improve attitudes towards breastfeeding in public were identified in terms of social marketing campaign content, target population and media. Future work should include developing focused social marketing campaigns, possibly drawing on norm based interventions to target members of the public who are most likely to oppose breastfeeding in public via the media channels most likely to reach them.

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Table 1: Comparison of the Demographic Characteristics of the Sample ($N=7158$) and General Population of the United Kingdom*

Characteristics		Study Sample n (%)	UK Population n (%)
<i>Gender</i>			
	Male	585 (8.2)	31,028,143 (49.1)
	Female	6573 (91.8)	32,154,035 (50.9)
<i>Age</i>			
	18-19	32 (0.4)	1,652,619 (3.8)
	20-24	244 (3.4)	3,423,878 (7.8)
	25-29	921 (12.8)	4,306,340 (9.8)
	30-34	1953 (27.2)	4,125,449 (9.4)
	35-39	1745 (24.3)	4,194,477 (9.5)
	40-44	835 (11.6)	4,625,635 (10.5)
	45-49	404 (5.6)	4,643,100 (10.6)
	50-54	315 (4.4)	4,094,454 (9.3)
	55-59	267 (3.7)	3,614,078 (8.7)
	60-64	221 (3.1)	3,807,974 (8.7)
	65-69	149 (2.1)	3,017,480 (6.9)
	70-74	83 (1.2)	2,462,745 (5.6)
<i>Nationality</i>			
	British	6813 (94.9)	55,188,698 (87.3)
	Other	328 (4.6)	7,993,480 (12.7)
	Unstated	37 (0.5)	NA
<i>Education</i>			
	No Formal Qualifications	47 (0.7)	11,897,294 (23.2)
	GCSEs (Equivalent to U.S. High School Diploma) at grade D-G; Qualifications at level 1 and below / Intermediate 1 and Access 1 to 3	86 (1.2)	3,768,457 (14.1)
	GCSEs (Equivalent to U.S. High School Diploma) at grade A*-C; Vocational level 2 / Intermediate 2 / Vocational level 2 / Intermediate 2	398 (5.6)	5,395,062 (18.5)
	GCSE AS and A level (Similar To Advanced Placement	838 (11.9)	3,890,397 (12.1)

Characteristics	Study Sample <i>n</i> (%)	UK Population <i>n</i> (%)
exams (AP) / Vocational level 3 / Highers		
Higher Education (First degree) or equivalent	3099 (43.8)	9,227,027 (27.0)
Higher Education (Postgraduate)	2539 (35.9)	
International qualification	62 (0.9)	1,430,409 (5.1)
<i>Household Income</i>		<i>UK equivalised household disposable income of individuals**</i>
< £14,999 (\$18,777)	460 (7.0)	6,322,000 (10.0)
£15,000-24,999 (\$18,778-31,295)	849 (13.0)	18,590,000 (29.9)
£25,000-39,999 (\$31,296-50,074)	1462 (22.4)	22,038,000 (35.5)
£40,000-54,999 (\$50,075-68,852)	1343 (20.5)	9,647,000 (15.5)
£55,000-69,999 (\$68,853-87,629)	1049 (16.0)	4,116,000 (6.6)
> £70,000 (\$87,630)	1377 (21.0)	1,379,000 (2.2)
<i>Religion</i>		
Anglican	1065 (16.7)	
Roman Catholic	502 (7.9)	14,603,973 (62.5)
Other Christian	1052 (16.5)	
Muslim	41 (0.6)	745,261 (3.2)
Hindu	10 (0.2)	261,202 (1.1)
Jewish	35 (0.5)	110,726 (0.5)
Atheist/Agnostic	1222 (19.1)	NA
No Religion	2463 (38.5)	5,633,958 (24.1)

Notes: * (Office for National Statistics, 2011a, 2011b, 2011c, 2011d, 2011e, 2019). ** The UK equivalised household disposable income of individuals (Office for National Statistics, 2019) is not directly comparable to our self-reported household income

Table 2: Underlying Dimensions of Participants' Attitudes toward Breastfeeding in Public

Variables	Loadings	Communality
1: Breastfeeding is acceptable in public places (ζ_1: AVE: 0.81; CCR: 0.95; α: 0.93; Eigenvalue: 9.69; s^2: 23.07)		
BF is acceptable in cafes	0.982	0.937
BF is acceptable in parks	0.977	0.911
BF is acceptable on public transport	0.955	0.906
BF is acceptable in restaurants	0.936	0.84
BF is always acceptable in public	0.573	0.467
2: Breastfeeding is healthy, convenient and economical (ζ_2: AVE: 0.64; CCR: 0.90; α: 0.85; Eigenvalue: 3.03; s^2: 7.22)		
BF is better for mother's health	0.845	0.743
BF is better for baby's health	0.812	0.708
BF is more convenient for mother	0.796	0.665
BF is cheaper for the family	0.789	0.628
BF is saves NHS money	0.763	0.565
3: Breastfeeding in public is disgusting (ζ_3: AVE: 0.47; CCR: 0.81; α: 0.64; Eigenvalue: 2.79; s^2: 6.64)		
Breast milk is disgusting	0.789	0.521
BF is disgusting	0.746	0.627
BF is a disgusting bodily function	0.652	0.406
BF is natural	-0.605	0.561
BF is regular food for babies	-0.602	0.465
4: Breastfeeding in public offends others (ζ_4: AVE: 0.54; CCR: 0.82; α: 0.72; Eigenvalue: 1.96; s^2: 4.67)		
Other cultures are offended by BF	0.834	0.684
Male teenagers are unsettled by BF	0.763	0.607
Women unable to BF are offended	0.667	0.460
Older people are offended by BF	0.656	0.481
5: Comfortable around breastfeeding (ζ_5: AVE: 0.74; CCR: 0.89; α: 0.84; Eigenvalue: 1.90; s^2: 4.52)		
Friends/family often BF around me	0.895	0.681
Comfortable with BF on TV	0.860	0.873
Comfortable with BF in public	0.822	0.891

6: Embarrassing inadvertent gaze (ζ_6: AVE: 0.60; CCR: 0.81; α: 0.81; Eigenvalue: 1.83; s^2: 4.35)		
Concerned that inadvertently looking may embarrass the mother	0.859	0.774
Embarrassed about accusation of staring if inadvertently looking	0.840	0.768
Don't know where to look when someone's BF in public	0.585	0.628
7: Mothers who breastfeed in public are self-absorbed and inconsiderate (ζ_7: AVE: 0.59; CCR: 0.81; α: 0.83; Eigenvalue: 1.62; s^2: 3.86)		
Mothers who BF in public think they are better than anyone	0.863	0.706
Mothers who BF in public enjoy making a show of it in public	0.787	0.697
Mothers who BF in public have little respect for those around them	0.639	0.682
8: Mothers who breastfeed in public feel uncomfortable and vulnerable (ζ_8: AVE: 0.74; CCR: 0.85; α: 0.83; Eigenvalue: 1.38; s^2: 3.23)		
Mothers who BF in public feel uncomfortable	0.862	0.756
Mothers who BF in public feel vulnerable	0.860	0.758
9: Bottle feeding is best in public (ζ_9: AVE: 0.64; CCR: 0.84; α: 0.60; Eigenvalue: 1.27; s^2: 3.02)		
Women should express their milk to bottle feed in public	0.893	0.784
Women should opt for formula milk in public	0.893	0.774
Bottle feeding is more acceptable in public	0.567	0.408
10: Normative beliefs about breastfeeding in public (ζ_{10}: AVE: 0.64; CCR: 0.83; α: 0.71; Eigenvalue: 1.14; s^2: 2.71)		
Most people are happy about BF in public	0.812	0.732
Most people are comfortable with discreet BF in public	0.800	0.589
Most people object to BF in public	-0.732	0.648
11: Partial nudity for fashion or on TV is acceptable (ζ_{11}: AVE: 0.93; CCR: 0.96; α: 0.93; Eigenvalue: 1.06; s^2: 2.52)		
Partial nudity on TV adverts is acceptable	0.964	0.925
Partial nudity for fashion purposes is acceptable	0.962	0.926
12: Social exclusion of breastfeeding mothers (ζ_{12}: AVE: 0.43; CCR: 0.75; α: 0.65; Eigenvalue: 1.01; s^2: 2.41)		
Some who are uncomfortable BF in public opt for formula milk	0.700	0.662
Some who are uncomfortable BF in public may feel socially isolated	0.685	0.672
It is unlawful to treat women differently because they BF in public	0.67	0.582
It is not right to treat women differently because they BF in public	0.559	0.593

Notes: 12 dimensions explained 68.29% of the overall variance; KMO: 0.882; Bartlett's test of sphericity: 165503.899; df : 861; $p < 0.001$. AVE = average variance extracted: $\sum \lambda^2 / n$; CCR = composite construct reliability: $(\sum \lambda)^2 / (\sum \lambda)^2 + (\sum \varepsilon)$; α = Cronbach's (reliability) coefficient alpha; s^2 = variance; Parallel analysis using a Monte Carlo simulation confirmed the 12-dimension structure.

Table 3: Predicting Attitudes to Breastfeeding in Public

Independent Variables	Beta	t
Model 1: Breastfeeding is always acceptable in public (<i>Adjusted R</i>² = 0.47; <i>F</i> = 695.05; <i>p</i> <0.001)		
1. Breastfeeding is acceptable in public places	0.58 ²	47.81
12. Social exclusion of breastfeeding mothers	0.10 ²	10.14
2. BF is healthy, convenient and economical	0.03 ²	3.61
5. Comfortable around breastfeeding	-0.13 ²	-12.97
7. Mothers who BF in public are self-absorbed and inconsiderate	-0.13 ²	-11.59
9. Bottle feeding is best in public	-0.05 ²	-4.39
8. Mothers who BF in public feel uncomfortable and vulnerable	-0.03 ¹	-3.09
V. People are sexually aroused by BF in public	-0.03 ¹	-2.89
4. Breastfeeding in public offends others	-0.03 ¹	-2.69
Model 2: Breastfeeding is never acceptable in public (<i>Adjusted R</i>² = 0.28; <i>F</i> =284.90; <i>p</i> <0.001)		
7. Mothers who BF in public are self-absorbed and inconsiderate	0.16 ²	12.31
9. Bottle feeding is best in public	0.12 ²	9.60
3. BF in public is disgusting	0.11 ²	9.06
2. BF is healthy, convenient and economical	0.06 ²	5.12
1. Breastfeeding is acceptable in public places	-0.27 ²	-21.36
10. Normative beliefs about breastfeeding in public	-0.06 ²	-5.71
8. Mothers who BF in public feel uncomfortable and vulnerable	-0.06 ²	-5.20
12. Social exclusion of breastfeeding mothers	-0.06 ²	-5.04
6. Embarrassing inadvertent gaze	-0.04 ¹	-3.46
11. Partial nudity for fashion or on TV is acceptable	-0.03 ¹	-2.64

Notes: (1) significant at the $p < 0.01$ level; (2) significant at the $p < 0.001$ level.

Durbin-Watson statistics (1: 2.00; 2: 1.96); VIF values (1: 1.11-1.97; 2: 1.02-1.71); Tolerance statistics (1: 0.51-0.90; 2: 0.58-0.98).

R^2 values may be inflated due to multicollinearity because Promax rotation was used in the factor analysis.

In both models, the confidence intervals indicate that the estimates are likely to be representative of 95% of other samples.

Table 4: Differences in Attitudes to Breastfeeding in Public by Respondent Demographics

Dimensions/Key Variables	1	2	3	4	5	6	7	8	9	10
It is always acceptable to BF in public	6.89 ²	15.05 ²	1.29	10.89 ²	1.64	12.29 ²	7.96 ²	16.22 ²	28.14 ²	0.50
1. Breastfeeding is acceptable in public places	7.37 ²	11.60 ²	1.87	5.98 ²	5.11 ²	14.63 ²	11.36 ²	17.89 ²	31.27 ²	11.86 ²
2. Breastfeeding is healthy, convenient and economical	11.97 ²	2.51 ^{1*}	2.72	1.20	0.38	21.82 ²	26.45 ²	14.62 ²	125.85 ²	12.29 ¹
3. Breastfeeding is disgusting	6.91 ²	2.19 ^{1*}	2.19	14.69 ²	3.03 ¹	13.28 ²	15.48 ²	7.63 ²	7.17 ²	4.84 ²
4. Breastfeeding in public offends others	3.84 ²	2.52 ^{1*}	0.77	1.62	0.93	7.45 ²	3.46 ¹	5.69 ²	24.76 ²	0.25
5. Comfortable around breastfeeding	6.40 ²	3.18 ²	3.73 ¹	1.64	4.10 ²	11.42 ²	9.51 ²	10.49 ²	11.93 ²	1.38
6. Embarrassing inadvertent gaze	23.71 ²	10.25 ²	2.74	2.79	2.65 ^{1*}	24.52 ²	11.81 ²	13.76 ²	45.06 ²	8.13 ²
7. Mothers who BF in public are self-absorbed and inconsiderate	4.99 ²	9.41 ²	1.78	6.64 ²	1.14	10.17 ²	21.17 ²	17.06 ²	32.44 ²	10.31 ²
8. Mothers who BF in public feel uncomfortable and vulnerable	8.82 ²	25.16 ²	7.98 ²	0.14	4.38 ²	4.25	6.52 ²	2.93 ^{1*}	5.92 ²	12.39 ²
9. Bottle feeding is best in public	18.84 ²	12.28 ²	3.21 ¹	4.29 ²	2.22	26.58 ²	15.47 ²	19.95 ²	47.41 ²	11.06 ²
10. Normative beliefs about breastfeeding in public	0.13	11.22 ²	13.18 ²	4.90 ²	6.00 ²	5.36 ²	3.87 ²	5.97 ²	3.97 ¹	1.06
11. Partial nudity for fashion or on TV is acceptable	8.41 ²	9.68 ²	1.58	29.73 ²	2.13	6.31 ²	3.07 ¹	4.29 ²	1.88	5.36 ²
12. Social exclusion of breastfeeding mothers	16.87 ²	39.38 ²	4.16 ²	3.68 ¹	0.89	12.86 ²	8.90 ²	11.79 ²	20.98 ²	17.89 ²
I am sexually aroused by BF in public	33.66 ²	5.95 ²	1.88	1.37	1.37	9.96 ²	3.61 ²	7.77 ²	6.19 ²	1.48
People are sexually aroused by BF in public	18.37 ²	12.25 ²	1.30	2.83 ¹	2.82 ^{1*}	18.74 ²	4.07 ²	8.51 ²	24.05 ²	1.86

Note: Results from Welch's *t*-tests and one-way ANOVA tests with Games-Howell multiple comparison procedures: (1) significant at $p < 0.01$; (2) significant at $p < 0.001$; (1*) significant at $p < 0.01$, but should be interpreted with caution due to risk of Type 1 error. The variables: 'I am

sexually aroused by BF in public'; 'People are sexually aroused by BF in public' were also examined because of their low communality (< 0.2) i.e. $> 80\%$ unique variance. Moderators: 1 = Gender, 2 = Age, 3 = Education, 4 = Religion, 5 = Household Income, 6 = Children Y/N, 7 = Children breastfed, 8 = Children breastfed in public, 9 = Duration of breastfeeding, 10 = Currently breastfeeding. The variation in t and F values displayed in each row of the table for each dimension reflect the differences in ratings on the interval level variables (measured on 7-point scales) which load on each dimension, across each of the nominal items (1 to 10). The number of categories in each nominal item ranges from 2 (Gender) to 16 (Household Income). Values in each column (not in each row) are therefore more directly comparable, although the size of each value generally reflects the size of the differences between the categories in each nominal item.

Table 5: Differences in Attitudes to Breastfeeding in Public by Participant Media Usage

Dimensions/Key Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
It is always acceptable to BF in public	5.97 ²	5.99 ²	0.79	11.36 ²	4.54 ¹	2.06	2.05	1.17	1	1.54	1.37	1.73	3.71 ¹	3.71 ¹	1.17	5.60 ²	7.35 ²	3.07	4.22 ¹	4.06 ¹
1. Breastfeeding is acceptable in public places	6.51 ²	13.36 ²	2.58	12.26 ²	4.24 ¹	2.07	5.99 ²	3.42	0.84	1.84	1.43	0.59	7.13 ²	3.21	3.38 ¹	6.39 ²	6.07 ²	4.36 ¹	3.84 ¹	2.98
2. BF is healthy, convenient and economical	3.28	5.35 ²	1.47	4.54 ¹	1.04	0.99	0.77	2.58	2.23	0.68	1.45	1.56	1.38	1.79	0.79	1.59	0.4	1.35	1.94	0.14
3. BF in public is disgusting	1.28	1.75	0.67	2.75	1.75	0.76	1.44	0.87	0.91	4.59 ¹	0.38	1.38	0.48	2.89	1.23	1.72	3.95 ¹	3.79 ¹	2.42	6.22 ²
4. Breastfeeding in public offends others	4.63 ¹	5.29 ²	0.34	2.14	2.76	0.35	4.29 ¹	1.72	1.57	2.84	3.35	1.68	7.49 ²	1.33	5.33 ²	0.12	3.87 ¹	3.82 ¹	1.2	2.92
5. Comfortable around breastfeeding	1.51	8.93 ²	1.71	2.44	0.82	2.47	2.7	1.02	1.21	1.27	0.79	1.09	3.71 ¹	5.91 ²	2.31	1.71	4.51 ¹	2.4	5.37 ²	3.65 ^{1*}
6. Embarrassing inadvertent gaze	4.47 ¹	3.25	2.85	1.18	2.51	0.98	3.2	1.55	6.04 ²	3.01	7.39 ²	3.5	1.71	1.9	4.08 ¹	2.08	0.78	0.34	2.84	0.46
7. Mothers who BF in public are self-absorbed and inconsiderate	6.77 ²	6.21 ²	1.47	7.84 ²	3.32	0.86	2.27	1.23	2.45	3.23	4.78 ¹	2.49	4.48 ¹	3.04	3.43 ¹	8.78 ²	7.14 ²	4.99 ¹	5.14 ²	5.29 ²
8. Mothers who BF in public feel	4.12 ¹	8.00 ²	7.67 ²	12.11 ²	4.86 ¹	5.72 ²	2.76	2.81	2.9	2.79	3.15	3.87 ¹	5.41 ²	3.89 ¹	5.10 ²	8.58 ²	3.11	3.34	8.10 ²	1.5

Dimensions/Key Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
uncomfortable and vulnerable																				
9. Bottle feeding is best in public	5.35 ²	3.17	4.92 ¹	4.07 ²	3.1	1.97	2.64	2.23	2.1	3.91 ¹	1.97	1.33	2.36	3.88 ¹	0.78	3.23	2.88	3.87 ¹	3.45 ²	2.73
10. Normative beliefs about breastfeeding in public	2.16	20.10 ²	3.12	16.81 ²	3.18	7.79 ²	9.32 ²	5.22	1.89	1.74	9.81 ²	3.74 ¹	11.90 ²	3.25	13.43 ²	5.88	8.13 ²	2.79	6.36 ²	2.49
11. Partial nudity for fashion or on TV is acceptable	0.78	6.91 ²	2.16	3.48 ^{1*}	3.27	3.18	8.16 ²	6.11 ²	1.79	0.85	3.27	2.22	4.64 ¹	0.43	0.35	0.86	10.84 ²	8.66 ²	5.59 ²	9.18 ²
12. Social exclusion of breastfeeding mothers	2.32	3.56 ^{1*}	0.96	12.16 ²	4.31 ¹	1.58	1.32	2.69	0.99	1.47	0.4	0.45	0.93	5.62 ²	0.42	2.61	4.66 ¹	5.66 ²	1.13	1.52
I am sexually aroused by BF in public	2.11	1.11	2.89	0.06	2.09	2.05	4.36 ¹	5.14 ¹	1.04	0.93	0.99	*	1.56	2.77	4.61 ¹	1.77	2.34	4.94 ¹	3.91 ¹	4.06 ¹
People are sexually aroused by BF in public	0.62	1.12	3.01	0.77	4.73 ¹	1.83	0.73	2.12	1.81	3.82 ¹	2.48	2.94	1.35	2.56 ¹	2.26	2.53	0.68	1.67	2.04	1.22

Notes: Results from Welch's *t*-tests and one-way ANOVA tests with Games-Howell multiple comparison procedures: (1) significant at $p < 0.01$; (2) significant at $p < 0.001$; (1*) significant at $p < 0.01$, but should be interpreted with caution due to risk of Type 1 error. The variables: 'I am

sexually aroused by BF in public'; 'People are sexually aroused by BF in public' were also examined because of their low communality (< 0.2) i.e. $> 80\%$ unique variance. Moderators: 1 = Daily Mail; 2 = Guardian, 3 = Metro, 4 = BBC News, 5 = Daily Telegraph, 6 = Times, 7 = Observer, 8 = Financial Times, 9 = Daily Mirror, 10 = Daily Express, 11 = Sun, 12 = Daily Star, 13 = Independent, 14 = Radio/TV news, 15 = British Soaps, 16 = Documentaries, 17 = Comedies, 18 = Reality Shows, 19 = Dramas, 20 = Chat Shows; * test not performed because at least one group has zero variance. The variation in t and F values displayed in each row of the table for each dimension reflect the differences in ratings on the interval level variables (measured on 7-point scales) which load on each dimension, across each of the nominal items (1 to 10). The number of categories in each nominal item ranges from 2 (Gender) to 16 (Household Income). Values in each column (not in each row) are therefore more directly comparable, although the size of each value generally reflects the size of the differences between the categories in each nominal item.