

Using breastfeeding images to promote breastfeeding among young adults

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Abstract

Young adults' reactions to breastfeeding images were assessed using varied approaches. In Study 1, participants viewed posters from a breastfeeding campaign; many anticipated negative reaction to the campaign. In Study 2, participants viewed novel infant-feeding posters; breastfeeding posters were viewed for less time than bottle-feeding posters, regardless of the task assigned. In Study 3, participants were asked to rate their comfort level viewing infant-feeding images; greater discomfort was reported for breastfeeding images. Taken together, we argue that many young adults expect, and experience, discomfort viewing breastfeeding, but it is important to continue using breastfeeding images in promotion efforts.

Keywords

breastfeeding, health promotion, memory, perception, students

The composition of breast milk is thought to provide optimal nutrition for an infant and can benefit the health of both the infant and mother (see Horta and Victora, 2013; Victora et al., 2016); it is recommended by both the World Health Organization (WHO) and Health Canada to be given exclusively to infants for the first 6 months of life, with breastfeeding continuing for up to 2 years after (Health Canada, 2014; WHO, 2013). Although breastfeeding initiation rates tend to be high overall across the United States (75%; National Center for Chronic Disease Prevention and Health Promotion, 2014) and Canada (89%; Gionet, 2013), breastfeeding duration rates are considerably lower; the rate of exclusive breastfeeding at 6 months is only 18.8 percent in the United States and 26 percent in Canada. The WHO aims to increase exclusive breastfeeding rates to 50 percent by the year 2025 (WHO, 2014). To do this, it is necessary to address the many factors that influence whether, and for how long, a mother breastfeeds; factors include, but are not limited to, various socio-demographic barriers (e.g. limited education, unemployment, and low socioeconomic status), problems with breastfeeding (e.g. perception of low milk supply, inconvenience, and fatigue), return to work, intentions to breastfeed, breastfeeding self-efficacy, and adequate breastfeeding supports (e.g. Brown et al., 2013; Emmanuel, 2015; Li et al., 2008; Meedy et al., 2010).

The marketing of formula in general, and the direct marketing of formula to mothers, can also impact breastfeeding rates (e.g. Rosenberg et al., 2008; Zhang et al., 2013).¹ Zhang et al. (2013) found that, in a sample of over 3000 mothers, mothers reported greater overall media exposure to information about formula than about breastfeeding; exposure to formula through print and/or online media had a negative impact on duration of breastfeeding intentions and on actual breastfeeding initiation, respectively. In a focus group of mothers who chose to formula feed their infants, most mothers felt that formula was “just as good as or better than breast milk” (Bonia et al., 2013: 4), and that it was more convenient because feedings could be shared with others (e.g. partners could participate in feeding), giving the mother her independence. Mothers also reported being uncomfortable about the idea of breastfeeding in public; the view that one would have to breastfeed in private or cover up while breastfeeding also contributed to the perception that formula feeding was more convenient.

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Given the many barriers to breastfeeding, the appeal of formula, and the many factors that positively influence whether a mother breastfeeds, the WHO's goal of increasing the breastfeeding duration rate will require a myriad of solutions and approaches (e.g. reducing inequalities and ensuring access to care, improving breastfeeding supports at all levels, and increasing the scope of breastfeeding promotion efforts). Expanding the scope of breastfeeding promotion is the focus of this research.

Breastfeeding promotion through the lens of the Theory of Planned Behavior

The Theory of Planned Behavior (e.g. Ajzen, 1991) suggests that whether an individual engages in a behavior (e.g. breastfeeding), depends on factors such as their *intention* to engage in the behavior, their *attitudes* toward the behavior, and the *subjective norms* for that behavior (e.g. do people support the behavior, is there pressure to engage in the behavior?). In the context of breastfeeding, for example, mothers who report the intent to breastfeed are more likely to initiate breastfeeding, and breastfeeding duration is greater among those with higher intentions (e.g. Donnan et al., 2013; Meedya et al., 2010). Furthermore, mothers who reported an intention to breastfeed for 12 months or more were less likely to discontinue early (DiGirolamo et al., 2005). Breastfeeding intentions are higher among those individuals who believe that they can breastfeed successfully, have a positive attitude toward breastfeeding, who believe that breastfeeding is socially acceptable, and who believe that others support the decision to breastfeed (e.g. Cabieses et al., 2014; Giles et al., 2014; Mitchell-Box et al., 2013; Mutuli and Walingo, 2014; Swanson and Power, 2005). Cabieses et al. (2014), for example, reported that an intention to engage in mixed-feeding (a combination of bottle-feeding and breastfeeding) was predicted by the reported perception of bottle-feeding or mixed feeding as the social norm.

Unfortunately, negative media coverage of breastfeeding can become an obstacle for improving breastfeeding rates since it can influence perceptions of subjective norms for the behavior. Research suggests that when breastfeeding is represented in film or television programming, for example, it is often presented as being problematic relative to bottle-feeding (e.g. Foss, 2012; Henderson et al., 2000; Potter et al., 2000). Similarly, many news articles that reference breastfeeding tend to highlight individual cases where breastfeeding mothers were asked to cover up or to leave a public location, suggesting that breastfeeding in public is unacceptable (e.g. CBC News, 2014; Judd, 2015). Where there is uncertainty about how others will respond to seeing breastfeeding, or where bottle-feeding is perceived as the social norm, breastfeeding initiation and duration rates suffer (e.g. Avery and Magnus, 2011; Bonia et al., 2013;

Forster and McLachlan, 2010; Leeming et al., 2013; Meng et al., 2013; Scott and Mostyn, 2003).

Given that young adults are frequent consumers of mass media content (e.g. Lenhart, 2015), a negative media portrayal of breastfeeding could negatively impact this demographic's views on breastfeeding. Ensuring that this demographic sees positive examples of breastfeeding is particularly important since decisions about whether to breastfeed are made early on, even before individuals have children (e.g. Fairbrother and Stanger-Ross, 2010; Kavanagh et al., 2012; Leffler, 2000; Tarrant and Dodgson, 2007). Furthermore, exposure to breastfeeding is linked to more positive attitudes toward breastfeeding (including public breastfeeding) and a greater intent to breastfeed one's own child (e.g. Goulet et al., 2003; Marrone et al., 2008; Tarrant and Dodgson, 2007; c.f. Vari et al., 2013). To date, however, little is known about how young adults react when they are exposed to breastfeeding. While using breastfeeding images to promote breastfeeding may be one way to help counteract any negative media coverage of breastfeeding and to positively influence the perceived social norms around breastfeeding (see Giles et al., 2014), the impact of these efforts could be weakened if viewers respond negatively to seeing breastfeeding. Thus, it is important to assess young adults' reactions to being exposed to breastfeeding or breastfeeding images.

Young adults' reactions to breastfeeding

Much of what we know about how young adults react to seeing breastfeeding is through survey data assessing opinions about breastfeeding in public, and from responses to hypothetical scenarios (Acker, 2009; Kavanagh et al., 2012; Spurles and Babineau, 2011). From such data, it is clear that anticipated reactions to seeing breastfeeding are largely negative among young adults. In a sample of university students from the Southeast United States, for example, 67.8 percent of those surveyed reported that breastfeeding in public was unacceptable behavior, and 77.7 percent reported that it should only be done in private because it was an act of intimacy (Spear, 2007). Close to half of a sample of students surveyed from a Nursing program within the same region felt that women should not breastfeed in public (Spear, 2006). More recently, 71.0 percent of female and 47.7 percent of male undergraduate students, sampled from the University of Tennessee, indicated that public breastfeeding is embarrassing and unacceptable (Kavanagh et al., 2012). The majority of university-educated focus group participants in Eastern Canada also shared the view that public breastfeeding had to be done discreetly, or in designated areas, for it to be acceptable (Spurles and Babineau, 2011). In a Midwestern university-based sample, both younger (students) and older (faculty, staff, and administration) participants expressed neutral rather than positive attitudes

about the appropriateness of breastfeeding in public locations (Vari et al., 2013). Taken together, existing survey and focus group results indicate that young adults tend to disapprove of public breastfeeding even though they report being supportive of breastfeeding and are knowledgeable about the benefits of breastfeeding (Forrester et al., 1997; Kavanagh et al., 2012; Li et al., 2002; McIntyre et al., 2001; Scott et al., 1997; Spear, 2007; Spurles and Babineau, 2011; Tarrant and Dodgson, 2007).

One of the few studies to look at how young adults react to viewing a photograph of a breastfeeding mother was a study published by Acker (2009). In this study, a large sample of university students and older adults were presented with a set of nine photographs and had to answer six questions about the individual in the photo. The key manipulation was that one of the photographs depicted a mother breastfeeding her infant; half of the participants viewed a picture of a mother breastfeeding in private, while the remaining participants saw a picture of a mother breastfeeding in public. Evaluations were significantly more positive for the mother who breastfed in private than in public, which suggest more negative attitudes about the latter breastfeeding scenario. This interpretation is certainly consistent with the survey data reviewed above. Since there was no bottle-feeding photograph comparison, however, it is difficult to know how reactions to seeing a picture of a breastfeeding mother compare to those of seeing a bottle-feeding mother.

Fairbrother and Stanger-Ross (2010) at least partially addressed this issue in a study comparing female university students' reactions to pictures of breastfeeding versus bottle-feeding by having the participants evaluate an infant-feeding picture as part of a larger study. Half of the participants viewed a picture of a woman breastfeeding her infant while the other half viewed a picture of the same woman bottle-feeding her infant. Participants were given a list of positive-valence and negative-valence adjectives with which to rate the picture. Participants who viewed the breastfeeding picture assigned higher ratings on the positive-valence adjectives than those who viewed the bottle-feeding picture. They also, however, reported less positive attitudes toward public breastfeeding than public formula feeding, suggesting limitations to their support for breastfeeding.

More recently, Vieth et al. (2015) tested the effectiveness of viewing a breastfeeding poster campaign to improve comfort levels with breastfeeding. They recruited a convenience sample of participants from a local shopping mall in two rural communities in Newfoundland and Labrador, a region with low breastfeeding rates. Participants completed a short survey to assess their comfort levels with breastfeeding in public venues, and to assess awareness of the campaign. Participants who reported not being aware of the campaign were then shown the breastfeeding posters² and asked to study them for a brief time period. These participants then completed a

follow-up survey to assess whether viewing the posters changed their reported comfort levels. The researchers reported a small improvement in comfort level after seeing the posters. Although this is promising data, the intervention was brief and may have encouraged a change in response by asking participants to immediately reassess their comfort levels after viewing the posters. Additionally, the study did not focus specifically on young adults, who made up only a small proportion of the participants.

The present research

Given the limited number of studies that directly assess how young adults react to seeing breastfeeding, many questions remain unanswered. First, since participants in these studies were not asked how they think *others* would respond to seeing breastfeeding, it is not easy to assess their perception of the subjective norms around breastfeeding; this will be the focus of Study 1. Second, the studies look at minor manipulations of a single photo or poster rather than reactions to a range of breastfeeding and bottle-feeding photos, so there is a limit to the conclusions that can be drawn from these studies. Finally, although it is important to assess *explicit* reactions to breastfeeding and breastfeeding pictures (e.g. survey responses), the outcome of this type of assessment may be influenced by a social desirability bias, that is, a bias to respond in a socially acceptable way (Van de Mortel, 2008). Thus, it is equally important to assess reactions to both breastfeeding and bottle-feeding pictures using implicit measures such as memory tests and eye movements. Both of these latter two questions will be addressed using different methodologies in Study 2 (implicit measures of eye movements, memory tests) and Study 3 (explicit reaction to a range of infant-feeding pictures). Thus, the aim of all three studies reported here is to assess young adults' reactions to seeing images of breastfeeding.

Study 1

In Study 1, we first assessed the breastfeeding intentions of a sample of young adults attending university in Northeastern Nova Scotia, a region of the province where breastfeeding rates are low (e.g. Brown et al., 2013). In this study, we also assessed participants' reactions to a former provincial breastfeeding poster campaign. Doing so allowed us to establish a clear picture of the perception of social norms around breastfeeding.

Methods

Recruitment approach and measures. All undergraduate students who were enrolled in an Introductory Psychology course (approximately 750 students) at the researchers' institution were invited to complete a large paper and pencil survey package during class time. Participation was

voluntary. Participants received partial course credit for completing the surveys. This larger survey package included a survey of basic demographic information and the two key survey measures of interest. The first key measure was a forced-choice measure of breastfeeding intentions that required participants to indicate whether they wanted their own child to be breastfed. The other measure involved showing participants a single image of a former breastfeeding promotion poster series used in Nova Scotia. The size of the image made it possible for participants to clearly see the breastfeeding images used, as well as the title of the poster series “Nova Scotia promotes, protects, and supports breastfeeding!,” although the remainder of the poster text was not legible. Participants were asked to provide a written response to this poster campaign to indicate how they anticipated others would react to seeing the posters.

Inclusion and exclusion criteria. The initial inclusion criterion used was that participants had to be enrolled in Introductory Psychology and to be present in class on the day that the larger survey package was distributed. A total of 612 undergraduate Psychology students (463 females) completed the larger survey package in exchange for partial course credit. Ages of participants ranged from 17 to 58 years ($M = 18.79$, standard deviation (SD) = 2.92 years). Since the focus of this study was on young adults, and the majority (98%) of participants were between the ages of 17 and 23 years, responses from participants outside of this age range were excluded from the analysis.

Participants. A total of 594 participants (455 females) met the criteria for inclusion. The majority of participants (84.8%) were in their first year of university, and over half of them originated from Nova Scotia (58.8%). Ethnicity was not particularly diverse; 63.1 percent of the sample was Euro-Canadian, 1.9 percent African-Canadian, 1.2 percent Aboriginal, .5 percent Asian, and 17.8 percent selected “Other,”³ while .3 percent did not provide a response.

Procedure. Psychology course instructors informed potential participants in advance that they would have the opportunity to complete a package of surveys from various researchers within the Psychology Department and that the survey packages would be completed during a specified class period early in the academic year. Upper-level psychology students assisted with the distribution of the surveys in class and also collected the surveys as participants returned them. Course instructors were not in the classroom when the surveys were being completed. As noted above, in addition to basic demographic information, participants completed the two measures of interest for this particular study. The Breastfeeding Intentions question asked “Would you want your own child to be breastfed?” Participants could select either a “yes” or “no” response to this question.

The Breastfeeding Social Norms questionnaire involved showing participants a single image of a former breastfeeding promotion poster series used in the province. The participants were given a brief preamble about the purpose of the poster campaign (i.e. to promote breastfeeding) and then they were asked the following open-ended key question: “How do you think people will react to these posters?” Participants were given space on the survey to record their response.

Results and discussion

In response to the Breastfeeding Intentions question, 90.6 percent of respondents indicated that “yes” they would want their own child to be breastfed, while only 6.7 percent said “no,” and 2.7 percent did not provide a response. Thus, intentions to breastfeed reported within this group were very high. This measure, taken on its own, suggests that messages around breastfeeding promotion must be reaching this sample on some level. Furthermore, it indicates that attitudes toward breastfeeding must be generally positive since the majority of respondents plan to breastfeed. These findings are promising, given that breastfeeding intentions predict behavior (e.g. Donnan et al., 2013; Meedya et al., 2010). Intentions to breastfeed, however, do not guarantee initiation or continued breastfeeding following initiation. One’s perception of social norms around breastfeeding and the perceived social acceptability of breastfeeding, among other factors, also play a role (e.g. Cabieses et al., 2014).

With respect to the Breastfeeding Social Norms questionnaire, which assessed anticipation of the reaction that members of the general public would have to the provincial breastfeeding poster campaign, 94 of 594 (15.8%) participants did not provide any response to this question. It is difficult to interpret what this non-response means. It may be that these participants did not feel that the questionnaire was relevant to them because it depicted breastfeeding, or it could be that they were uncomfortable seeing the breastfeeding image and chose to skip this particular survey. A content analysis was conducted on the remaining 500 participant responses. Because the goal of this study was to capture how participants’ felt others would react to seeing the breastfeeding poster campaign, two different raters independently coded the overall valence of each response; responses were coded as being generally positive, negative or mixed. By coding responses, it was possible to assess the perceived social norms around breastfeeding among this group of participants. Cohen’s k was computed to assess the level of agreement in the categorization of responses across the two raters. Agreement between the raters was almost perfect ($k = .831$, $p < .0001$); most disagreements between raters typically involved use of the “negative” versus “mixed” categories. After independently rating participant responses, the reviewers met to discuss and resolve any

discrepancies in their ratings. The means reported below are based on these adjusted ratings.

Positive comments were those where the participant clearly anticipated a positive response to the poster campaign or general acceptance of the campaign. For example, one participant said, "I think people will react normally to these posters because breastfeeding is important to newborn babies and is natural among pregnant/new mothers." Likewise, another participant said, "I don't think people [will] mind these posters, it's a part of life." Negative comments were those where participants clearly anticipated a negative public response to the poster, or a response of disapproval. One participant said, "Not well, people are going to think they are obscene and inappropriate," while another participant wrote,

I think people will write nasty words like "slut or tramp" on the poster and will not take the idea the poster is trying to portray seriously, because the girl breastfeeding her child looks very young—like 15! Also, boys are immature and if they see a young woman (or an old woman) with her breast almost fully exposed, they will take the poster the wrong way and only focus on the body part not the message. People will react to these posters but not in the way they want them to react.

Mixed responses were those that indicated either that some people would react positively, while others would react negatively, or responses that indicated that people would respond positively to one aspect of the campaign (e.g. breastfeeding promotion), but not to other aspects (e.g. breast exposure). One participant remarked, "Some people may take offense to the posters, especially if they can't breastfeed, but mothers who have, they will be very supportive of the campaign." Another participant wrote, "I think for the most part they will be accepted, but some people will find faults, like too much boob or if the moms look young, they will say teen pregnancy is encouraged."

Of the 500 responses provided, the majority of responses were categorized as *mixed* ($n=293$; 58.6%). Furthermore, more than twice as many responses were categorized as being *negative* ($n=149$; 29.8%) compared to *positive* ($n=58$; 11.6%). To gain further insight into these ratings, we assessed how often the sight of the breast (i.e. breast exposure) was provided as a reason for the anticipated *negative* or *mixed* response. Interestingly, breast exposure was frequently cited (i.e. cited within 248 or 56.1% of the negative and mixed comments) as being one reason for the negative response to the campaign.

The results from this study paint an interesting picture. First, the majority of respondents indicated that they want their future child(ren) to be breastfed, which suggests that breastfeeding intentions are high. When asked how the public would respond to seeing a breastfeeding poster campaign that depicted breastfeeding, however, the majority of respondents anticipated a negative or mixed response to the

campaign. This indicates that there is still a perception of negative social norms around breastfeeding. Perceptions such as these pose a potential barrier for any increase in breastfeeding duration rates. Considering that almost half of the negative or mixed comments included a reference to breast exposure, this strongly suggests that breastfeeding in public is perceived as an issue and furthermore that hypersexualization of the breast might be the underlying reason (see Johnston-Robledo et al., 2007).

Anticipated discomfort seeing breastfeeding is a barrier that needs to be addressed in future efforts to promote breastfeeding. Given that, within the media, breastfeeding is often represented as being problematic relative to bottle-feeding (e.g. Foss, 2012; Henderson et al., 2000), efforts should be made to ensure that positive examples of breastfeeding are prominent in the media, and that the public has ample opportunity to be exposed to breastfeeding (e.g. promote breastfeeding friendly spaces to encourage breastfeeding anytime and anywhere).

In this study, young adults were asked how they thought *others* would respond to seeing the breastfeeding promotion poster; the response clearly indicated the anticipation of a negative reaction from others. If young adults were asked how *they* would react to seeing the poster themselves, however, the response is likely to be more positive, but it would be difficult to tease apart whether they actually felt comfortable viewing the breastfeeding poster or whether they were responding in a socially desirable way. One way around this issue is to use an alternate measure of response to the poster. That is, rather than ask participants to describe how they would react to seeing the poster, it is possible to use a less conscious and controllable measure to assess reaction, in this case, looking behavior and reaction time.

Study 2

It is possible that a negative perception of social norms around breastfeeding, and limited opportunities to see breastfeeding, could impact how young adults look at and process any poster aimed at promoting breastfeeding. To assess reactions to seeing breastfeeding, it would be ideal to use a measure that is minimally susceptible to response bias. In Study 2, we used eye-tracking technology to record looking behavior, while participants viewed novel infant-feeding posters designed specifically for this study. The posters included an infant-feeding picture paired with a brief feeding-relevant slogan. The posters were presented in random order to participants. Measuring eye movements provided an implicit measure on which to compare how young adults view breastfeeding versus bottle-feeding; differences in looking times could be compared across the two picture types. Based on past eye movement research (e.g. Mogg et al., 2003; Rinck and Becker, 2006), and what is known about anticipated reactions to seeing breastfeeding (e.g. Acker, 2009; Kavanagh et al., 2012; Spurles and

Babineau, 2011), it was predicted that looking times would be shorter for breastfeeding posters than for bottle-feeding posters since the former would be more likely to elicit discomfort.⁴

Participants were assigned to complete one of three timed categorization tasks designed to focus attention on the infant-feeding picture, the slogan, or both. Using different types of tasks helped to vary the degree to which participants were required to focus on the breastfeeding and bottle-feeding images. We predicted that participants would be faster to complete categorization tasks that required them to look at the image versus the slogan, and faster when the poster they were looking at included a breastfeeding image. Following the categorization task, participants were given a surprise slogan recall and recognition task to assess memory for the slogans. The unexpected memory test allowed us to determine whether the ability to recall or recognize written information that was paired with the image depended on the type of image viewed. We predicted that recall and recognition of the slogans would be worse for slogans that were paired with breastfeeding images.

Method

Recruitment approach. Upper-level psychology student researcher and second author (J.D.) visited the classrooms of Introductory Psychology courses at the researchers' institution to recruit potential participants for this study. After providing each class with a short verbal description of the research project and what it entailed as a participant, a sign-up sheet was circulated around the classroom for interested participants.

Inclusion and exclusion criteria. All students enrolled in Introductory Psychology were eligible to participate in this study. A total of 99 student participants (79 women, 20 men) visited the lab to participate in the study. Since the main aim of this study was to determine whether there are differences in how young adults view breastfeeding versus bottle-feeding posters, and whether the type of poster viewed can influence memory for the accompanying slogans, it was critical to have looking data for each participant. Thus, participants were excluded from the study if eye movement data could not be collected, and/or if there was an issue with the categorization data (e.g. not following task instructions). Using these exclusion criteria, 27 participants were excluded from the analysis; this was due to unexpected technical issues ($n=1$), confusion with task instructions ($n=3$), and incomplete or insufficient eye movement data⁵ ($n=23$).

Participants. In total, data were analyzed from 72 participants (55 females, 17 males), with 24 participants per

categorization task (12 participants for each possible response mapping). Participants received partial course credit for their participation.

Procedure. Participants were randomly assigned to complete one of three timed categorization tasks involving infant-feeding posters presented on an eye-tracker. Posters consisted of a breastfeeding or bottle-feeding image paired with a slogan. The same posters were used for each task. In the *Picture Assessment task*, participants decided whether the picture depicted breastfeeding or bottle-feeding. In the *Slogan Assessment task*, participants decided whether the tone of the slogan was positive or negative. And, in the *Slogan-Picture Appropriateness task*, participants decided whether the slogan was appropriate for the picture with which it was paired. As soon as participants made a decision, they responded by pressing one of two assigned computer keys. Response times (RTs) were recorded for each task, as well as looking time (as assessed through dwell times using the eye-tracking equipment) within two defined poster areas, in this case, the slogan versus the picture. Following the completion of the categorization task, participants were asked to complete two memory tests: slogan recall and slogan recognition. Since participants were not told about these memory tests at the outset of the study, the tests were unexpected, and served as a way to assess passive intake of the slogans. Accuracy for the memory tasks was recorded.

Participants were seated approximately 60cm from a Tobii Eye-Tracking Device XL (60Hz sample rate), on which the infant-feeding posters were presented. Posters were displayed for a minimum of 2000ms (observation period) and remained on display until participants responded.⁶ Of the 40 posters, half included breastfeeding images and the other half included bottle-feeding images. Images were selected from those available on the Internet via search engines, using the criteria that the breastfeeding and bottle-feeding images were comparable to one another, the images could be resized to one of two common sizes without distortion, and that the racial diversity of moms and babies portrayed in the images roughly matched the diversity of our potential sample. All of these criteria helped to maximize the generalizability of the results of this study. Of the 20 breastfeeding images selected, seven showed a close-up of the baby on the breast with the mother being only partially visible, while the remaining images showed both the mother and baby in complete view. In 10 of the 20 breastfeeding images, the mother's breast was partially visible. Of the 20 bottle-feeding images selected, seven showed a close-up of the baby being bottle-fed with the view of the mother obscured, while the remaining images showed both the mother and baby in complete view. Some images naturally had a more horizontal orientation (measuring 15.1×8.6 degrees of visual angle) than others (measuring 11.6×9.7 degrees of visual angle). Below each image was a slogan typed in white Times New Roman font and presented on a black background. A

total of 20 unique slogans were used, where each slogan was paired with two different infant-feeding images (either two different breastfeeding images or two different bottle-feeding images). Some slogans were positively framed (e.g. Off to the best start, Healthy eating for a healthy mind), while others were negatively framed (e.g. Reduce the risks, Proper feeding reduces illness). Slogans were positioned approximately 9.5 degrees of visual angle below the image, and ranged from three to six words in length.

Before the experiment began, participants underwent an eye movement calibration to ensure that the device was able to detect the participant's eyes and track them as they moved. Successful calibration was followed by the Categorization Task, which involved the presentation of the infant-feeding posters in random order. Response mappings for each of the categorization tasks were counterbalanced across participants. For example, half of the participants in the *Picture Assessment* task used one response mapping (“z” for breastfeeding pictures, “/” for bottle-feeding pictures) while the other half used the opposite response mapping.

After viewing all 40 picture-slogan pairs and making forced-choice decisions regarding each pair, the participants were presented with a surprise Slogan Recall Task, which required them to use the keyboard to type as many slogans as they could recall. Following the completion of this task, participants were then presented with a surprise Slogan Recognition Task. In this task, old and new slogans were presented one at a time and participants were asked to decide whether the slogan was previously presented in the Categorization Task (i.e. old) or whether it was never shown before (i.e. new). Responses were made by pressing one of two computer keys (e.g. “z” for old or “/” for new). Accuracy for both memory tasks was recorded.

Results and discussion

Categorization RTs (in ms). Categorization RT data were subjected to analyses of variance (ANOVAs) using the within-subjects factors of Picture Type (Breast or Bottle), between-subjects factors of Categorization Task (Picture Assessment, Slogan Assessment, and Slogan-Picture Appropriateness), and Response Mapping (A or B). As pictured in Figure 1, categorization times were significantly faster overall for breastfeeding pictures (1459 ms) than for bottle-feeding pictures (1713 ms), $F(1, 66)=8.61, p<.01$. There were also significant differences in overall categorization times across the three tasks, $F(2, 66)=11.77, p<.01$. Categorization times were fastest in the Picture Assessment Task (878 ms), slowest in the Slogan Assessment Task (2239 ms), and intermediate in the Slogan-Picture Appropriateness Task (1641 ms), all p 's $<.05$. This finding is consistent with the prediction that categorization times would be faster for tasks that required participants to look at the image on the poster. No other main effects or interactions reached significance.

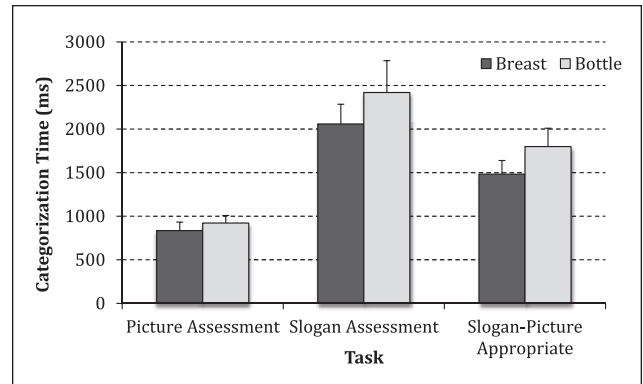


Figure 1. Categorization time (in ms) as a function of Task Type \times Image Type (significant main effects of Picture Type and Task, p 's $<.01$).

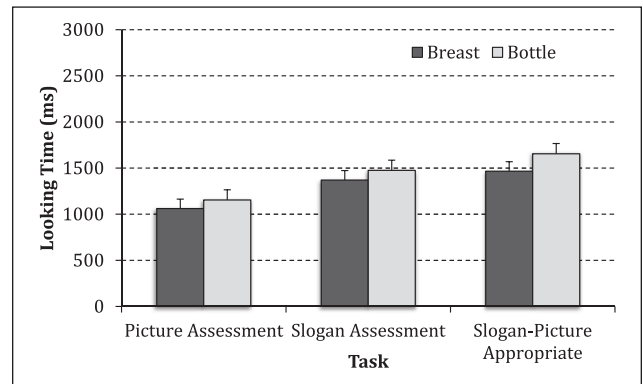


Figure 2. Looking time (in ms) as a function of Task Type \times Feeding Type (significant main effects of Picture Type and Task, p 's $<.01$).

Looking time (in ms). Looking time data were subjected to ANOVAs using the within-subjects factors of Poster Area (Slogan or Picture) and Feeding Type (Breast or Bottle), and the between-subjects factor of Categorization Task (Picture Assessment, Slogan Assessment, and Slogan-Picture Appropriateness). As pictured in Figure 2, looking times were shorter overall when the posters depicted breastfeeding (1299 ms) versus bottle-feeding (1428 ms), $F(1, 69)=15.9, p<.01$. This finding is consistent with the prediction that participants would minimize the time they spent on breastfeeding images compared to bottle-feeding images. Looking times also varied across task type, $F(2, 69)=5.03, p<.01$. That is, looking times were significantly (p 's $<.05$) shorter for the Picture Assessment task (1107 ms) than either the Slogan Assessment task (1422 ms) or the Slogan-Picture Appropriateness task (1560 ms), which did not differ from one another.

As pictured in Figure 3, participants looked at slogans (653 ms) for significantly less time than pictures (2074 ms),

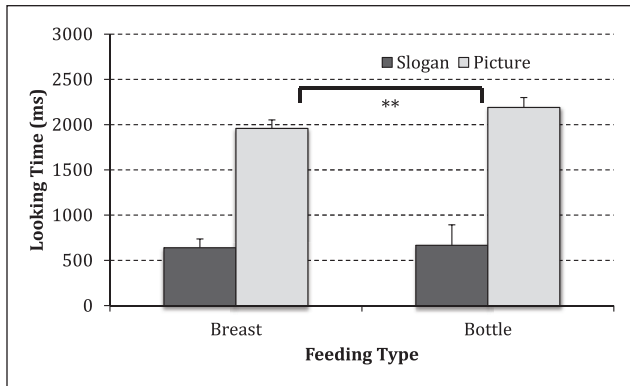


Figure 3. Looking Time (in ms) as a function of Feeding Type \times Poster Area (significant main effect of Poster Area, $p < .01$). ** $p < .01$.

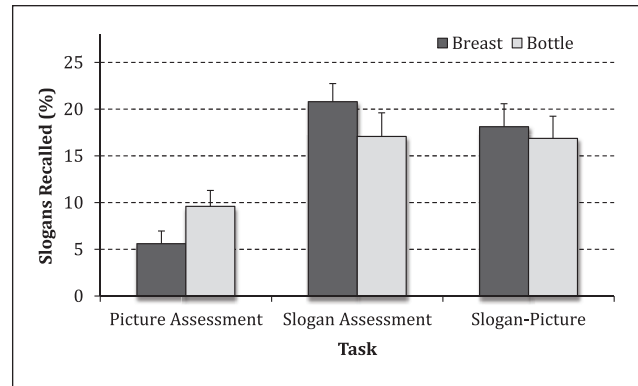


Figure 5. Slogans Recalled (%) as a function of Task Type \times Image Type (significant main effect of Task, $p < .001$, with recall lowest in the Picture Assessment task).

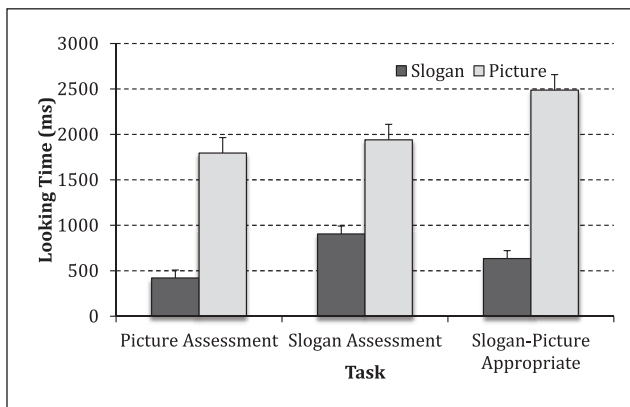


Figure 4. Looking Time (in ms) as a function of Task Type \times Poster Area (significant interaction, $p < .01$, where looking time was longer for the Slogan Assessment Task than the other two tasks).

$F(1, 69) = 196.7$, $p < .01$. The Feeding Type (Breast, Bottle) \times Poster Area (Slogan, Picture) interaction was significant, $F(1, 69) = 12.01$, $p < .01$. Simple effects tests revealed that there was no significant difference in the time participants spent looking at slogans paired with a breastfeeding image (639 ms) or a bottle-feeding image (667 ms), $F(1, 71) = 1.11$. There was, however, a significant difference in looking time for the pictures when the poster depicted breastfeeding (1958 ms) versus bottle-feeding (2189 ms), $F(1, 71) = 17.05$, $p < .01$. These results confirm that participants looked at both types of pictures and the slogans paired with those pictures. As expected, breastfeeding posters were viewed for significantly less time than bottle-feeding posters.

The Task Type (Picture Assessment, Slogan Assessment, or Slogan-Picture Appropriateness) \times Poster Area (Slogan or Picture) interaction was also significant, $F(2, 69) = 5.48$, $p < .01$; see Figure 4. Simple effects tests revealed that the time participants spent looking at the slogans significantly

differed across tasks. The longest looking times occurred for slogans in the Slogan Assessment Task (904 ms, p 's $< .01$), compared to either the Picture Assessment task (420 ms) or the Slogan-Picture Appropriateness task (634 ms), which did not differ from one another, $F(2, 69) = 7.63$, $p < .01$. In contrast, the overall time that participants spent looking at the pictures was significantly longer (p 's $< .05$) in the Slogan-Picture Appropriateness task (2487 ms) than for either the Picture Assessment task (1795 ms) or the Slogan Assessment task (1940 ms), which did not differ from one another. As expected, these findings indicate that where participants looked, and how long they looked, depended on the task assigned to them.

Slogan recall (%). Slogan recall (%) data were subjected to ANOVAs using the within-subjects factors of Picture Type (Breast or Bottle), between-subjects factors of Categorization Task (Picture Assessment, Slogan Assessment, and Slogan-Picture Appropriateness), and Response Mapping (A or B). The percentage of slogans that were recalled did not significantly differ based on whether a breastfeeding (14.9%) or bottle-feeding (14.5%) picture was present; in other words, there was no main effect of Picture Type, $F < 1$; see Figure 5. Slogan recall was similarly low across both poster types. The reasons for this are not yet clear and will require further study, but would be expected to improve if participants were given advance notice of the memory test. Slogan recall, however, did vary across task (i.e. significant main effect of Task Type), $F(2, 66) = 16.1$, $p < .001$. Recall was significantly lower (p 's $< .01$) in the Picture Assessment task (7.6%) than in either the Slogan Assessment task (19.0%) or the Slogan-Picture Appropriateness task (17.5%), which were statistically similar. This finding likely reflects the fact that the slogan was not relevant for the completion of the Picture Assessment task, but was relevant to the other two tasks. No other main effects or interactions reached significance.

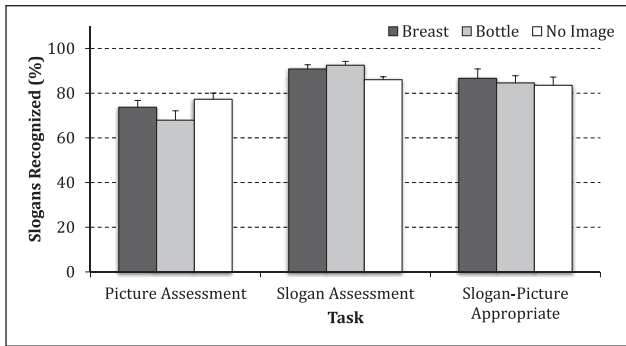


Figure 6. Slogans Recognized (%) as a function of Task Type \times Image Pairing (significant interaction, $p < .05$, where in the Slogan Assessment task recognition was highest for slogans paired with bottle-feeding pictures).

Slogan recognition (%). Slogan recognition data (% correct) were subjected to ANOVAs using the within-subjects factors of Picture Pairing (Breast, Bottle, or None), between-subjects factors of Categorization Task (Picture Assessment, Slogan Assessment, and Slogan-Picture Appropriateness), and Response Mapping (A or B). Overall, accuracy on the slogan recognition test was similar whether the slogan was new (82.3%), that is, not previously paired with a picture, or paired with a breastfeeding picture (83.8%), or bottle-feeding picture (81.7%), $F(2, 132) < 1$, n.s. Again, this finding is in contrast to the hypothesized outcomes. The percentage of slogans that were recognized with each type of picture pairing, however, depended on the categorization task assigned (i.e. significant Picture Pairing \times Task Type interaction, $F(4, 132) = 3.13$, $p < .05$) (see Figure 6). Simple effects tests revealed a significant main effect of Picture Pairing in the Slogan Assessment task only, $F(2, 46) = 3.71$, $p < .05$. Slogans paired with bottle-feeding pictures were better recognized (92.5%) than new slogans (86%, $p < .05$), but did not differ with respect to breastfeeding pictures (90.8%). No main effects or other interactions reached significance.

Task assessment measures (%). Because each Categorization Task involved a different measure (% correct for the Picture Assessment task, percent positive for the Slogan Assessment task, and percent appropriate for the Slogan-Picture Assessment task), measures were analyzed separately. Each analysis involved an ANOVA using the within-subjects factor of Picture Type (Breast, Bottle), between-subjects factors of Categorization Task (Picture Assessment, Slogan Assessment, Slogan-Picture Appropriateness), and Response Mapping (A or B):

Picture Assessment Task. Participants in this task were equally accurate at categorizing breastfeeding pictures (99% correct) and bottle-feeding pictures (98%

correct), $F(1, 22) = 2.80$, $p > .10$. No other effects were significant.

Slogan Assessment Task. More of the slogans paired with breastfeeding pictures were rated as positive (88% positive) compared to the slogans paired with bottle-feeding pictures (51% positive),⁷ $F(1, 22) = 44.3$, $p < .01$. No other effects were significant.

Slogan-Picture Appropriateness Task. More of the slogans that were paired with breastfeeding pictures were categorized as appropriate (80% appropriate) compared to the slogans paired with bottle-feeding pictures (44% appropriate), $F(1, 22) = 21.4$, $p < .01$. No other effects were significant.

The results from this study suggest that regardless of the task, participants were faster to make their categorization decisions in the presence of a breastfeeding image versus a bottle-feeding image. This was the case even when the image was irrelevant to the task, as in the Slogan Assessment Task. Additionally, participants tended to look at the breastfeeding images for a significantly shorter period of time than the bottle-feeding images. Taken together, these results suggest that participants reacted differently to breastfeeding and bottle-feeding images. One possible interpretation for these differences in looking times is that participants may have experienced discomfort when looking at the breastfeeding images. This interpretation is entirely consistent with the results from existing survey and focus group data suggesting that individuals are embarrassed to see breastfeeding, particularly in a public setting (Forrester et al., 1997; Kavanagh et al., 2012; Li et al., 2002; McIntyre et al., 2001; Spurles and Babineau, 2011; Tarrant and Dodgson, 2007). This interpretation also aligns with the results from Study 1, where the majority of participants expected others to have a negative or mixed reaction to a breastfeeding poster campaign that depicted breastfeeding. It is entirely possible that young adults not only expect others to be uncomfortable to see breastfeeding but also experience discomfort when exposed to breastfeeding images. Given that people tend to have more experience with seeing bottle-feeding than seeing breastfeeding, it would make sense that they are less comfortable seeing the latter. This again points to the importance of exposure.

It was interesting that this quantitatively different response to breastfeeding versus bottle-feeding images did not lead to poorer recall and recognition of the slogans paired with the breastfeeding images. Slogan recall and recognition varied across tasks (i.e. lowest overall in the Picture Assessment Task), but did not depend on image pairing (i.e. breastfeeding versus bottle-feeding). This finding is good news for the promotion of breastfeeding; it suggests that even if people tend to minimize how long they look at breastfeeding posters (whether because of discomfort, or not), this decreased looking time is likely to have

minimal impact on how well they process the written information that accompanies the picture. Even though this study provides clear evidence that people made faster decisions about breastfeeding versus bottle-feeding posters, and that they looked at breastfeeding pictures for shorter durations, it remains to be seen whether these findings can be attributed to discomfort.

Study 3

In Study 3, we wanted to determine whether discomfort viewing breastfeeding images could account for the shorter viewing times of the breastfeeding versus bottle-feeding posters in Study 2. We recruited a new group of participants for this study for three main reasons. One, exposure to breastfeeding images has the potential to positively influence how comfortable one is to see breastfeeding, so we wanted a group of participants who would see these images for the first time, just like the original participants in Study 2. If we tested the same group of participants, the pictures would have been familiar and may not elicit the same level of discomfort the second time around. Two, although the breastfeeding and bottle-feeding pictures used in Study 2 were comparable, they were selected from those available on the Internet, which meant that there were inevitable variations in the photos from the two sets. Thus, it would be helpful to know whether this same photo set elicits discomfort in a new group of participants. Three, by testing a new group of participants, it was possible to assess discomfort within a larger sample of participants, which would ensure greater generalizability of the results. We predicted that participants would be significantly more uncomfortable viewing breastfeeding images.

Method

Recruitment approach. Undergraduate students enrolled in Introductory Psychology classes at the researchers' institution were invited, by email and/or through short in-class presentations, to participate in a large online survey package. Participation was voluntary and surveys were completed outside of class time.

Inclusion and exclusion criteria. To be included in the study, students had to be enrolled in Introductory Psychology, and they had to complete the large online survey package. A total of 440 undergraduate psychology students participated and received partial course credit. Participants were excluded from this study if they did not complete the survey of interest, the Picture Rating survey; six participants were excluded for this reason. Again, since the focus of the study was on young adults, we limited our analysis to those participants aged 17–25 years; this criterion excluded an additional four participants.

Participants. In total, there were 430 participants (336 females, 92 males, and 2 undisclosed) who were included in this study. The average age of participants was 18 years old. The majority (87.9%) of students were in their first year of university. Within the sample, 87 percent were Euro-Canadian, .9 percent African-Canadian, .9 percent Asian, .5 percent Aboriginal, and 7 percent selected "Other."

Procedure. The introductory text included with the Picture Rating survey informed participants that they would be looking at images that depicted infant feeding and that were being considered for use in educational materials. They were asked to indicate how comfortable they felt viewing each image. Comfort ratings were made using a 7-point Likert scale (1=very uncomfortable and 7=very comfortable). All 40 images (20 breastfeeding and 20 bottle-feeding) used in Study 2 were presented in random order to each participant. Ratings for each image were recorded electronically. In order to compare ratings for breastfeeding images where the mother's breast was partially visible to those where the breast was not visible, ratings were averaged across the 10 pictures in these two subgroups. To compare ratings of breastfeeding and bottle-feeding images, ratings were averaged across all 20 pictures within each picture type to provide an average breastfeeding comfort rating and an average bottle-feeding comfort rating for each participant.

Results and discussion

To confirm that there was internal consistency across ratings for the 20 breastfeeding images and across ratings for the 20 bottle-feeding images, a reliability analysis was conducted for each image set. Cronbach's alpha for comfort level ratings of breastfeeding images was .98, suggesting high internal consistency. Similarly, Cronbach's alpha for ratings of bottle-feeding images was also .98, which suggests high internal consistency for that image set as well. Average comfort ratings were computed for each picture in the two picture sets. Average comfort ratings for each of the 20 breastfeeding images ranged from a low of 3.60 to a high of 5.89. Average comfort ratings for each of the 20 bottle-feeding images ranged from a low of 5.95 to a high of 6.49. It is interesting to note that the average comfort ratings at the top range for breastfeeding images was lower than the average ratings at the bottom range for bottle-feeding images. Given these differences in the range of comfort ratings, it is obvious that participants were uncomfortable viewing the breastfeeding images and that they responded very differently to these images than they did to the bottle-feeding images.

A dependent samples *t*-test was conducted to compare average comfort ratings for breastfeeding versus bottle-feeding pictures. Participants rated being significantly less comfortable looking at breastfeeding pictures (4.90) than

bottle-feeding pictures (6.33), $t(429) = -19.45$, $p < .001$. This finding is consistent with “discomfort” seeing breastfeeding images as a possible explanation for the shorter looking times for breastfeeding versus bottle-feeding posters in Study 2.

A dependent samples t -test was also conducted to compare average comfort ratings for the 10 breastfeeding images where the mother’s breast was partially exposed to the 10 images where the breast was not exposed. Ratings were significantly lower when the mother’s breast was visible (4.26) than when the breast was not visible (5.55), $t(429) = -23.81$, $p < .001$. This difference in ratings indicates that participants are significantly less comfortable viewing breastfeeding images where the mother’s breast is visible than where the breast is concealed in some way. Again, these results are also consistent with the “discomfort” hypothesis that was proposed as an explanation for the shorter looking times on breastfeeding posters compared to bottle-feeding posters in Study 2. These findings are also consistent with the existing literature suggesting people tend to be uncomfortable seeing a woman breastfeeding her baby (e.g. Meng et al., 2013; Stewart-Knox et al., 2003) and believe that mothers should cover up and be discreet if they are to breastfeed in public (Spurles and Babineau, 2011).

General discussion

The aim of this research was to assess both implicitly and explicitly how young adults react to seeing breastfeeding. In Study 1, participants were asked to look at a breastfeeding promotion poster and indicate how others might react to seeing the poster; many participants believed that public response to *seeing* breastfeeding is one of discomfort and disgust. This negative perception of the social norms around breastfeeding has the potential to keep future breastfeeding rates low. Despite this perception, we found that most young adults intend to breastfeed their child(ren). Although the intent to breastfeed is high in this sample of young adults, and is promising for breastfeeding in the future, social norms could negatively impact the duration of breastfeeding. One way to improve the perception of social norms is through positive exposure to breastfeeding and breastfeeding images (e.g. Giles et al., 2014). For example, it is now well established that previous exposure to breastfeeding is linked to positive attitudes about breastfeeding and one’s intent to breastfeed (Greene et al., 2003; Hoddinott et al., 2010; Isaacowitz et al., 2006; Tarrant and Dodgson, 2007). Increased opportunity for exposure to breastfeeding is particularly important in geographic areas where it is still relatively uncommon to see breastfeeding.

One relatively easy way to increase exposure to breastfeeding in geographic regions where breastfeeding rates are low is through poster campaigns where breastfeeding images are visible on the posters. We asked in Study 2 how young

adults would react to seeing breastfeeding posters and whether the presence of the breastfeeding image would impact their memory for the accompanying slogan. We found that when young adults were presented with infant-feeding posters, they looked at the breastfeeding posters for significantly less time than the bottle-feeding posters, regardless of the task that they were assigned. Even though we are not able to say with certainty why this is, we know from the recognition memory test that memory for the slogans used in these posters was comparable across both poster types, suggesting that shorter looking times on breastfeeding posters did not jeopardize intake of the accompanying message.

In Study 3, we explicitly asked participants to rate their comfort level viewing the same breastfeeding and bottle-feeding images used in Study 2. The comfort ratings assigned to breastfeeding images were unquestionably lower than those assigned to the bottle-feeding images, indicating that participants experienced discomfort when seeing breastfeeding. Based on these results, it seems likely that the shorter looking times for breastfeeding posters in Study 2 also reflect discomfort, especially since looking times were short across all tasks.

Using breastfeeding images to promote breastfeeding might help to normalize images of the functional or nurturing breast, and in the long run, could both reduce the embarrassment of seeing breastfeeding and the embarrassment of being the one to breastfeed in public. This is important given evidence suggesting that intent to breastfeed and subsequent breastfeeding behavior is lower for women who express embarrassment about breastfeeding (Bonia et al., 2013; Hoddinott et al., 2010) and that “not wanting to breastfeed in public” was cited as being an important reason for discontinuing breastfeeding in a large survey sample of US mothers (Li et al., 2008). Breastfeeding initiation is higher among women exposed to breastfeeding through television or video compared to those with no exposure to breastfeeding (e.g. Hoddinott et al., 2010). Thus, showing positive images of breastfeeding in various contexts, such as poster campaigns, may be one way of increasing exposure and improving comfort level and attitudes over time.

Limitations

This research provides some promising, albeit preliminary, data to suggest that using breastfeeding images to promote breastfeeding can be done without jeopardizing the intake of the accompanying message, even if the viewer might be uncomfortable seeing the breastfeeding images. Future research can confirm that individuals who self identify as being uncomfortable seeing breastfeeding images still process any written messages that accompany those images.

It was somewhat surprising that slogan recall was low overall for both poster types. It is possible that since the posters were randomly presented such that breastfeeding posters were intermixed with bottle-feeding posters, the

presence of breastfeeding posters impacted how the bottle-feeding posters were processed. Further study is needed to see if this is the case. For example, if presentation of poster types is blocked, will slogan recall improve for bottle-feeding posters? Another possibility is that since participants were not explicitly asked to remember the slogans (the memory test was a surprise), maybe they only minimally processed the slogans. This is an interesting possibility that has implications for how posters are processed in general. Finally, the slogans varied across posters. This is different from typical poster campaigns where only a few different slogans are used. Perhaps the slogans would have been more memorable and recalled more easily if there were fewer slogans, and if the same slogans were used consistently across posters. These are all possibilities to be explored in future research. Future research is also needed to confirm whether the results of this study extend to slogans that are longer in length, and slogans that tend to be more novel (less catchy) or that seem less familiar.

Conclusion

Despite high intentions to breastfeed, our sample of young adults reported mixed or negative perceptions of public reaction to seeing breastfeeding images. This discrepancy is concerning for two reasons. One, although young adults may see the value in breastfeeding and may want to breastfeed, uncertainty in how others will react may hamper this behavior. Two, these results suggest that young adults are still getting mixed messages about breastfeeding; breastfeeding is something to be done but not something to be seen. Positive exposure to breastfeeding could help ensure that the messaging around breastfeeding is more uniform and consistent. This research should alleviate concerns that using breastfeeding images to promote breastfeeding might come at a cost to message processing. Our results suggest that even if viewing time is limited, it is still possible to take in the messaging paired with breastfeeding images. We know from past research that exposure to breastfeeding is linked to intent to breastfeed and positive attitudes toward breastfeeding (Hoddinott et al., 2010; Tarrant and Dodgson, 2007), so using breastfeeding images within promotional campaigns will likely be far more beneficial than it is risky. Not only should increased exposure to breastfeeding improve overall comfort levels, but it may also help to narrow the gap that is growing between the acceptability of bottle-feeding in public and the acceptability of breastfeeding in public.

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Notes

1. For a brief overview of the history of infant feeding, see Stevens et al. (2009).
2. The breastfeeding image was clearly visible on these posters, although they were not central to these posters (i.e. other items were larger and designed to draw attention to them).
3. We suspect that some participants were confused by the response option "Euro-Canadian," as many listed "White" or "Caucasian" beside the "Other" option.
4. We recognize that faster looking times could be interpreted in multiple ways, including more discomfort or less interest, both resulting in faster disengagement, or it is also possible that faster looking times could occur for images with greater saliency. Regardless of the interpretation, a difference in looking time between breastfeeding and bottle-feeding pictures would suggest differences in how these two types of stimuli are processed and that difference is important to explore further.
5. There were a variety of reasons for incomplete eye movement data, including metal-framed glasses, light-colored irises, a significant shift in the participant's viewing position during the testing period, and so on.
6. Participants could respond at any point in time, but if the response occurred before the observation period had ended, the poster would remain on display for the full 2000 ms before being replaced by the next poster.
7. To test whether the picture might have influenced the categorization of slogans, the same slogans used in this study were given to a new group of 30 participants to be categorized as positive or negative. Note, in this case, that the slogans were shown to participants in isolation rather than paired with a picture. The results indicated that 100 percent of the "breastfeeding" slogans, when viewed in isolation, were rated as positive by the majority of participants, while 80 percent of the "bottle-feeding" slogans were rated as positive. When these results are compared to the results of the Slogan Assessment task, it is clear that the slogans were more likely to be rated as negative when paired with a picture (particularly a bottle-feeding picture), suggesting that the picture type influenced how the slogans were judged. This cannot simply be explained by a difference in time spent on the bottle-feeding versus breastfeeding posters since this should reflect results more similar to those found when the slogans were viewed in isolation. Instead, this difference likely reflects the result of a conscious

assessment of bottle-feeding versus breastfeeding when the slogans are paired with a picture. That is, if you believe that breastfeeding is healthy for a baby, you might rate the slogan “Off to the best start” as negative when it is paired with a bottle-feeding picture because it is inconsistent with the notion that “Breast is Best.” Even though this relative comparison was not the task assigned to participants, it seems reasonable to think that the picture could still influence one’s assessment of the slogan. The results of the slogan-picture appropriateness task lend support to this idea as the slogans that were paired with the bottle-feeding pictures were more likely to be rated as inappropriate than those linked to the breastfeeding pictures.

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