

Effects of physical-activity-related anti-weight stigma materials on implicit and explicit evaluations

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Abstract

Objective: Although there exist videos and images created by Obesity Canada and similar organizations (e.g., the Rudd Center for Food Policy and Obesity), it is not known if the materials have the desired effect of reducing stigma against people with obesity and might have the opposite effect of increasing stigma. Therefore, two studies used implicit and explicit evaluations to examine the effectiveness of images and videos intended to reduce weight stigma.

Methods: Study 1 participants ($N = 284$; $M_{\text{age}} = 31.47$ years [$SD = 11.26$]; 177 self-identified as women; 83 self-identified as living with obesity) completed two implicit measures (one with images of people living with obesity and the other with control images) followed by a weight stigma questionnaire. Study 2 participants ($N = 308$; $M_{\text{age}} = 31.54$ years [$SD = 11.35$]; 153 self-identified as women; 59 self-identified as living with obesity) were randomly assigned to view an obesity and exercise video and images of persons with obesity, control video and images of persons with obesity, obesity and exercise video and control images, or control video and control images, followed by the implicit measures and explicit evaluation questionnaire.

Results: Implicit evaluations of the control images were more positive than the images of persons with obesity. Participants with no history of obesity who saw the control video and control images had lower weight stigma compared to participants in the other conditions.

Conclusions: Materials created to reduce weight stigma might not be effective among people with no history of obesity themselves or via a family member or friend. Intervention and health promotion researchers may wish to investigate effects of the images in combination with other messages because simply using the nonstigmatizing images is likely not enough.

KEYWORDS

images, physical activity, weight stigma

1 | INTRODUCTION

People with obesity are often made to feel shame when they engage in physical activity.¹ At the same time, media often show stigmatizing, stereotypical images of people living with obesity engaged in sedentary activity.² These portrayals may reinforce erroneous beliefs that obesity stems from individual choice, which can lead to less public support for effective obesity-related policies and greater weight stigma among members of the general public.³ Weight stigma is defined as the “social devaluation of people based on their body weight,” which can lead to stereotyping these people as inherently lazy or unmotivated and assuming that their size is due to individual choices.⁴

Organizations such as Obesity Canada and others (e.g., World Obesity Federation, The Rudd Center for Food Policy and Obesity) have created positive, nonstigmatizing images of people with obesity in a variety of contexts, including physical activity, that are free for use.⁵ Obesity Canada has also created videos (“Bust the Bias” series⁶) that are intended to educate people about misperceptions they may have about obesity. The videos and images created by Obesity Canada and similar organizations are freely available for use by health promotion organizations and media. However, it is not known if the materials have the desired effect of reducing bias against people with obesity and might have the opposite effect. For example, one study showed that people who did not have obesity had higher explicit weight stigma after viewing images of people with obesity exercising compared to when they viewed images of lean people exercising.⁷ In contrast, framing obesity as a disease reduced weight stigma compared to not framing it as a disease, mediated by an increase in positive affect.⁸ However, greater contact with obesity was not a moderator of the experimental manipulation on weight stigma, despite others suggesting that having friends or family with obesity might moderate weight stigma.⁹ Women with obesity have also questioned whether the physical activity images created by Obesity Canada would have the desired effect of changing stereotyped perceptions that are created by more generally seen images of physical activity.¹⁰ The research reported here also compared images of people with obesity being active to pictures of people without obesity being active because there is evidence that exercisers benefit from a generally positive stereotype.^{11,12} The positive exerciser stereotype literature indicates that exercisers are considered to be happier, more motivated, energetic and disciplined, and also more committed and busy, than nonexercisers.¹² Images in the control condition also showed active people. This controlled for exercise status and ensured the main difference between the images in the conditions was body size.

People living with obesity may be evaluated at automatic (i.e., negative implicit evaluations of obesity-related stimuli) and reflective levels (i.e., explicit evaluations of people with obesity).¹³ Explicit evaluations are typically measured with a questionnaire, whereas implicit evaluations are demonstrated as responses to stimuli (e.g., images of people with obesity) on implicit measures that force fast responses.¹⁴ Implicit evaluations may be based on strength of the association (e.g., obesity and negative feelings) or may reflect

automatically activated propositions (e.g., people with obesity are lazy; 13–14). Researchers reported more negative implicit evaluations when people with obesity were shown engaged in stereotypical behaviors (e.g., watching tv) compared to when they were engaged in nonstereotypical behaviors (e.g., exercising; 15). Negative implicit evaluations of the stereotypical images were related to participants' preoccupation with weight, fear of fat, and appearance orientation.¹⁵

A population sample of women demonstrated more negative implicit evaluations of obesity in the 2 weeks after high profile incidences of celebrity fat-shaming compared to the 2 weeks prior to the incidences.¹⁶ This implies that widely viewed media may influence how people with obesity are evaluated. The hope of organizations such as Obesity Canada is that their images will mitigate the negative effects of such common, stigmatizing, portrayals of people living with obesity. This research was designed to address that question.

Nonstigmatizing images of people with obesity may have different effects on implicitly and explicitly measured evaluations.^{13,14} Therefore, the current research included two studies that used implicit and explicit measures to examine the effects of images and videos intended to reduce weight stigma. Study 1 was a descriptive study designed to examine implicit evaluations of images of people with obesity being physically active in comparison to images of people without obesity being physically active and if the evaluations were related to explicitly measured evaluations. It was hypothesized that implicit evaluations of the images of people without obesity would be more positive than implicit evaluations of images of people with obesity and that negative implicit evaluations of the images of people with obesity would be related to higher explicitly measured evaluations. Study 2 built from the first study to investigate the effects of a video created to reduce stigma (by discussing how exercise has many benefits but does not necessarily lead to weight loss), in combination with images from study 1, on implicit and explicit evaluations. It was hypothesized that participants who viewed the video intended to reduce weight stigma in conjunction with the images of people living with obesity would have the most positive implicitly and explicitly measured evaluations, whereas participants who viewed a video about being active, which did not mention weight (control video), and images of nonobese people being active (control images) would have the most negative implicitly and explicitly measured evaluations.

2 | METHODS

Participant recruitment and many of the measures were the same across both studies. Inquisit software¹⁷ was used to present the studies online.

2.1 | Participants

Adults from the United Kingdom, the United States, Canada, New Zealand, and Australia, aged 18–65 years, were recruited using

Prolific.¹⁸ Prolific is a research-focused platform that adheres to transparency using guidelines based on research ethics. Researchers upload their study, identify inclusion criteria, and participants are paid for their time. Prolific has been shown to have equal drop-out rates, internal reliability of scales (high), and attention paid to tasks (acceptable), while having more diverse participants compared to other online platforms.¹⁹

In study 1, two hundred and ninety participants met the inclusion criteria. After exclusion of participants with missing data on the explicit weight stigma measure, or excessive errors or extreme scores (± 3 SD) on an IAT, the final sample size was 284, of whom 83 self-identified as living with obesity ($M_{\text{BMI}} = 35.21$ [SD = 10.20]) and 201 did not ($M_{\text{BMI}} = 24.54$ [SD = 5.56]). Other demographic information is shown in Table 1.

Although an initial 445 participants were recruited for study 2, 92 reported that they were unable to see the video on their platforms. Of those who did view the video, 40 had excessive errors or extreme scores (± 3 SD) on an IAT or did not complete the explicit weight stigma measure. Comments on the videos were used as a manipulation check. Five participants provided no evidence of having paid attention to the video and were excluded. This left a final sample of 308 participants for analysis. Of these, 59 self-identified as living with obesity ($M_{\text{BMI}} = 30.51$ [SD = 5.66]) and 246 did not ($M_{\text{BMI}} = 23.78$ [SD = 5.93]); three did not report. One hundred and eighty-five participants self-reported that they were not living with obesity, nor did they have a close family member or friend who did. Other demographics are reported in Table 1.

2.2 | Measures

2.2.1 | Implicit evaluations

Two single-category Implicit Association Tasks (IAT)²⁰ had participants categorize images as quickly as possible by pressing keys on a computer keyboard. The three categories were “physical activity,” “good,” and “bad.” In one IAT, eight physical activity images were drawn from Obesity Canada’s image bank. In the other IAT (i.e., control), the eight physical activity images were of people without obesity, found using Google image search. The control images included models who were neither extremely thin nor muscular, wearing nonrevealing clothing, and were of about the same age as the models with obesity. Both the Obesity Canada and control images included people with either neutral expressions or who were smiling. Four of each set of images were in gym settings and four were outdoors; the gym images were carefully matched so that each set showed a person running on a treadmill, on an exercise bike, lifting weights, or stretching. The outdoor images in each set included a person on an exercise mat stretching, a person cycling, a person walking alone, or a two people walking together. These images were paired with eight “smiley” (“Good” category) and eight “frowny” (“Bad” category) emojis.²¹ In one block, the physical activity images and frowny emojis shared the same response button (“Physical

activity and Bad”) and smiley emojis the other response button (“Good”). This was reversed in the other block so that the physical activity images and smiley emojis shared the same response button. The order of the physical activity images and emojis was random and the block order counterbalanced across participants. Participants were shown a red X if they made an error and the next trial did not appear until they corrected their response. Response times in milliseconds (ms) were used to calculate *D*-scores as a measure of implicit weight stigma, according to the improved scoring algorithm.²² A higher score indicates a more positive implicit evaluation of the images. Separate *D*-scores were calculated for each IAT, within each study.

2.2.2 | Explicit evaluations

This construct was measured with the 14-item Fat Phobia Scale.²³ It is a semantic differential scale, including adjective pairs such as lazy/industrious and active/inactive, measured on a 1–5 scale. A higher score represents higher weight stigma.

2.2.3 | Demographics

Age, gender, education, ethnicity, and height and weight (used to calculate body mass index [BMI]) were self-reported. Leisure time physical activity (LTPA) was assessed with one question asking frequency of moderate intensity physical activity for at least 30 min over the past 3 months: not at all, about once a month, about two or three times a month [all categorized as insufficiently active], about once a week, about twice a week [moderately active], about three times a week, or four or more times a week [active]. Participants were asked if they currently lived with obesity, had previously experienced obesity, if there is anyone in their family who has obesity, or if they have close friends or partners who live with obesity. Participants were also asked if they had previously done a test similar to the IAT.

2.3 | Study 1 procedure

This research used a within subject’s crossover design. Participants completed the two IATs, with the order randomized across participants, followed by a survey of explicit weight stigma and demographics. Both studies received ethical approval from the human ethics review board at the University of Alberta.

2.4 | Results

There were no differences in *D*-scores between participants with prior IAT experience ($N = 86$) compared to those who did not ($N = 193$; five did not report), both $p > 0.54$; therefore, all participants were included

TABLE 1 Demographic information for participants in both studies

Demographic variable		Study 1 (N = 284)	Study 2 (N = 308)
Age M (SD)		31.47 (11.26)	31.54 (11.35)
N (%) female		177 (62.3%)	153 (49.7%)
Median education		Undergraduate degree (N = 88)	Undergraduate degree (N = 109)
LTPA N (%)	Insufficiently active	81	73
	Moderately active	77	97
	Active	121	137
	Did not report	5	1

Abbreviation: LTPA, leisure time physical activity.

regardless of IAT experience. There was also no difference in *D*-scores by IAT order, $p = 0.72$, or in explicit evaluations, $p = 0.91$.

The intraclass correlations using odd and even trials within each block of the IATs ranged between 0.91 and 0.94. There was one problematic item in the explicit weight stigma measure (shapeless/shapely), which had low correlations with all other items. After removal, internal reliability $\alpha = 0.89$ and the average of the remaining items was calculated to represent explicitly measured weight stigma (also done in study 2). There were no differences in implicit evaluations or explicit weight stigma by IAT order, LTPA, education group, or citizenship group. Men reported higher explicit weight stigma ($M = 3.74$ [SD = 0.58]) than women ($M = 3.53$ [SD = 0.61]), $F(1, 275) = 8.40$, $p = 0.004$, Cohen's $d = 0.35$. The range for implicit evaluations of the images of obesity was -0.77 – 1.22 ; the range for implicit evaluations of the control images was -0.98 – 1.15 ; and the range of explicit evaluations was 1.77 – 4.85 .

The first hypothesis, that implicit evaluations of the images of people without obesity would be more positive than implicit evaluations of images of people with obesity, was tested with a Repeated Measures Analysis of Variance (RM ANOVA) with *D*-scores as the within subjects' factor. Implicit evaluations of the control images were more positive ($M = 0.11$ [SD = 0.22]) than the images of persons with obesity ($M = 0.06$ [SD = 0.23]), $F(1, 283) = 6.84$, $p = 0.009$, Cohen's $d = 0.17$. The second hypothesis that negative implicit evaluations of the images of people with obesity would be related to higher explicitly measured evaluations was examined using correlation. The correlation between implicit evaluations of the images of persons with obesity and weight stigma = 0.03 and between implicit evaluations of the control images and weight stigma = -0.10 . The correlation between the two IAT scores = 0.10.

Following recommendations of other researchers,¹⁰ it was decided to explore differences in implicit evaluations by self-identified living with obesity groups (yes/no) and having friends or family with obesity (yes/no). The results are shown in Table 2. Participants with no history of obesity (i.e., were neither living with obesity nor had someone close to them with obesity) had significantly higher implicit evaluations of the control compared to images of persons with obesity, with a small to medium effect size. There were

no differences in explicit weight stigma by self-identified obesity, $p = 0.12$, nor by having friends or family with obesity, $p = 0.71$, nor was there an interaction, $p = 0.22$.

3 | DISCUSSION

The hypothesis that implicit evaluations of images of people without obesity would be more positive than images of people living with obesity was supported. An exploratory moderator analysis showed that participants with no history of obesity themselves or via a friend or family member had significantly stronger evaluations of the control images compared to the images of persons with obesity. This effect was not seen in participants with a history of obesity. These results support the concerns made by women living with obesity who while finding the physical activity images from Obesity Canada motivating and relatable, were still doubtful the images would be well received by members of the general public.¹⁰ The hypothesis that negative implicit evaluations of the images of people with obesity would be related to higher weight stigma was not supported.

3.1 | Study 2

3.1.1 | Design and procedure

Building on the results of the first study, this study used an experimental design to see if participants who viewed a "Bust the Bias" video in combination with the images of people with obesity from study 1 would have lower explicit weight stigma and more positive implicit evaluations compared to participants who viewed a physical activity video that did not mention obesity (control video) and control images. It was hypothesized that participants who viewed the Bust the Bias video in conjunction with nonstigmatizing images of people living with obesity would have the most positive automatic evaluations of images of people living with obesity. Based on the findings of study 1, it was also hypothesized that history with obesity would moderate these relationships.

TABLE 2 Study 1 results of post-hoc RM ANOVAs for implicit evaluations (*D*-score) by self-identified obesity group and having friends or family living with obesity

		Currently living with obesity	
		Yes	No
Currently have close friend or family member living with obesity	Yes	$N = 55$; $F(1, 54) = 2.79$, $p = 0.10$, Cohen's $d = 0.21$ Control D -score = 0.15, Obesity D -score = 0.10	$N = 54$; $F(1, 53) = 0.23$, $p = 0.64$, Cohen's $d = 0.08$ Control D -score = 0.01, Obesity D -score = 0.03
	No	$N = 28$; $F(1, 27) = 0.005$, $p = 0.94$, Cohen's $d < 0.01$ Control D -score = 0.09 Obesity D -score = 0.09	$N = 147$; $F(1, 146) = 12.01$, $p = 0.001$, Cohen's $d = 0.29$ Control D -score = 0.13, Obesity D -score = 0.05

Abbreviation: RM, repeated measures.

As outlined in Figure 1, participants were randomly assigned to one of four groups: obesity and exercise video and images of persons with obesity, control video and images of persons with obesity, obesity and exercise video and control images, or control video and control images. The obesity and exercise video was from Obesity Canada's "Bust the Bias" series. The video outlines how exercise has little effect on body weight but that regardless of what happens to weight, being regularly active will make you healthier.²⁴ The control video was created by the Canadian not for profit physical activity promotion organization, ParticipACTION. This video discusses how lack of physical activity can make you tired and less productive and describes how active breaks at work make you feel better.²⁵ Both videos feature cartoons, are under one minute long, and were edited to remove the logos at the end. Participants viewed the video within their condition and were asked to provide their thoughts about it. They were then shown ten images (from the IATs), eight of which were from the assigned condition (i.e., obesity or control) and two were from the other condition; this was done to provide variation in image type so that participants might be less attuned to the focus on body size. The images were presented in a random order. Each image was rated on 1–5 scales of unhealthy or healthy, unmotivated or motivated, and unfit or fit. After viewing each image, they were asked to explain their ratings. The image stayed on the screen until the participant clicked to the next one. After viewing the images, participants completed the outcome measures: the two SC-IATs followed by the explicit weight stigma and finally, a demographic questionnaire.

4 | RESULTS

There were no differences in D -scores between participants with prior IAT experience ($N = 69$) compared to those who did not ($N = 239$), both $p > 0.56$; therefore, all participants were included regardless of IAT experience. There was also no difference in D -scores by IAT order, $p = 0.39$, or in explicit evaluations, $p = 0.70$.

There were no differences between the four conditions on age, BMI, gender, education, LTPA, self-identified obesity, or having a family member with obesity, all $p > 0.14$. The range for implicit evaluations of the images of obesity was -1.14 – 0.82 ; the range for implicit evaluations of the control images was -0.55 – 0.96 , and the range of explicit evaluations was 1.85 – 5.00 . Due to a programming error, the image ratings data and comments are not reported.

The first hypothesis was examined with ANOVA (explicit evaluations) and RM ANOVA (implicit evaluations). Because of the unequal sample sizes in history of obesity groups, and violations of assumptions of equality of variance between groups, separate analyses were conducted for participants with no history of obesity and for participants with experience with obesity. For participants with no history of obesity, there was a significant video by image type interaction for explicit weight stigma, $F(1, 181) = 5.88$, $p = 0.02$, but no main effects for video type, $F(1, 181) = 0.47$, $p = 0.49$, or image type, $F(1, 181) = 1.38$, $p = 0.24$. Means and standard deviations are shown in Table 3. Participants who saw the control video and control images had lower weight stigma compared to participants who saw the control video and images of persons with obesity, Cohen's $d = 0.54$, the obesity video and control images, Cohen's $d = 0.47$, or obesity video and images of persons with obesity, Cohen's $d = 0.26$.

The results of a RM ANOVA, with implicit evaluations of the images of persons with obesity compared to the control images as the within subjects factor and video and image conditions as between subjects factors, for participants with no history of obesity, showed a significant within subjects effect, $F(1, 181) = 4.85$, $p = 0.03$, Cohen's $d = 0.23$. The implicit evaluations of the control images were significantly higher than the implicit evaluations of the images of persons with obesity. There were no differences between implicit evaluations for video type, $F(1, 181) = 0.21$, $p = 0.65$, image type, $F(1, 181) = 0.39$, $p = 0.53$, nor a significant interaction, $F(1, 181) = 0.89$, $p = 0.35$. Means and standard deviations are shown in Table 4.

Participants who either live with obesity themselves have a friend or family member with obesity, or both, were included in one group ($N = 123$) because the sample sizes were too small to examine

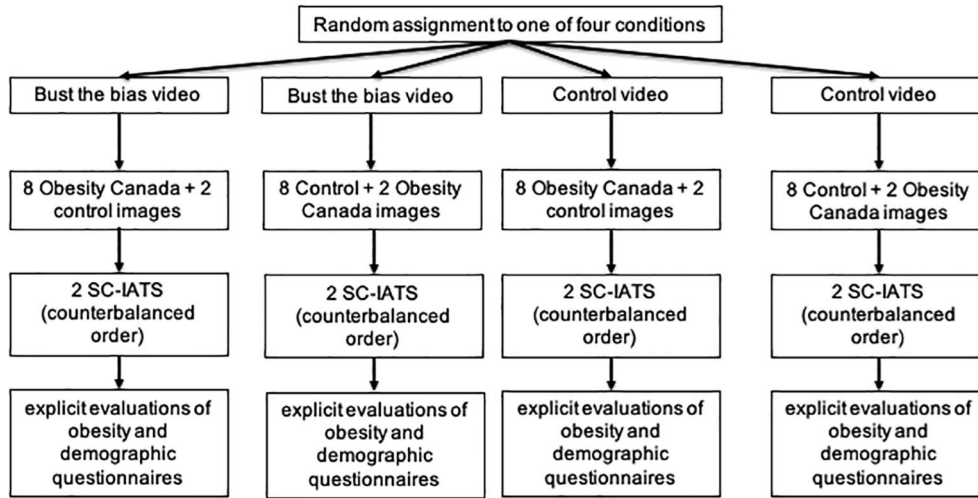


FIGURE 1 Study 2 procedures

TABLE 3 Study 2 means (*M*) and standard deviations (*SD*) for explicit weight stigma by experimental condition and experience with obesity and number of participants per group (*N*)

Condition		No experience with obesity		Has experience with obesity		Collapsed Across Condition <i>M</i> (<i>SD</i>)
Video	Image	<i>M</i> (<i>SD</i>)	<i>N</i>	<i>M</i> (<i>SD</i>)	<i>N</i>	
Obesity	Obesity	3.59 (0.73)	40	3.72 (0.44)	23	3.63 (0.64)
	Control	3.71 (0.63)	43	3.72 (0.54)	31	3.71 (0.59)
Control	Obesity	3.75 (0.61)	53	3.79 (0.66)	39	3.77 (0.63)
	Control	3.41 (0.65)	49	3.69 (0.57)	30	3.52 (0.53)

TABLE 4 Study 2 means (*M*) and standard deviations (*SD*) for implicit evaluations (*D*-score) by experimental condition and experience with obesity

Condition		No experience with obesity		Has experience with obesity	
Video	Image	Control <i>D</i> -score	Obesity <i>D</i> -score	Control <i>D</i> -score	Obesity <i>D</i> -score
Obesity	Obesity	0.18 (0.24)	0.14 (0.28)	0.15 (0.32)	0.15 (0.22)
	Control	0.18 (0.24)	0.13 (0.24)	0.17 (0.24)	0.14 (0.24)
Control	Obesity	0.18 (0.29)	0.06 (0.34)	0.10 (0.23)	0.15 (0.28)
	Control	0.12 (0.26)	0.09 (0.22)	0.13 (0.20)	0.12 (0.28)
Total		0.16 (0.26)	0.10 (0.28)	0.14 (0.24)	0.12 (0.25)

each group individually. There were no significant main effects for video, image, or video by image interactions for explicit weight stigma, nor within subjects' effects for implicit evaluations, all $p > 0.51$. Means and standard deviations for explicit weight stigma are in Table 3 and for implicit evaluations are in Table 4.

The video comments were coded to identify the participants' initial thoughts about the videos. For the "Bust the Bias" obesity video, the comments were generally positive (48%) and demonstrated agreement with the video's message (e.g., "It's a good message that's easy to digest. I like that it encourages exercise by saying that even if you don't lose weight, it still has positive benefits"). A smaller proportion of comments (14%) was negative or in disagreement with the message. e.g., one comment was "I do not agree with this narrator's thoughts. Especially coming from an organization for obesity, I think they should be trying to lose weight

with exercise. I do not think it is more motivating to rephrase this idea into 'exercise to be healthy.'"). Positive and negative comments were not mutually exclusive, so a comment could have been coded as both positive and negative. For example, one participant wrote, "It's true that exercising to lose weight won't help some people actually lose weight, but a general statement like 'don't exercise to lose weight' sounds like it would discourage the people who would see weight loss from exercising." Some comments (38%) were not categorized as either positive or negative. These included those stating that the information was not new, relating the video to one's self, and simply repeating the video's message. A similar pattern was found for the physical activity video, with 40% positive comments, 10% negative comments, and 50% neutral comments. There were no differences in comment type by history of obesity group.

5 | DISCUSSION

Participants with no history of obesity themselves or via a friend or family member who saw the Obesity Canada video, the images of active people with obesity, or both, had higher explicit weight stigma than participants in the control video and control images condition. The effect sizes were small to medium. Replicating the results of study 1, these participants also had higher implicit evaluations of the control images compared to obesity Canada images, regardless of which condition they were in.

5.1 | General discussion

This research examined the relationships and effects of physical activity-related materials created to reduce weight stigma on implicit evaluations and explicit weight stigma. One implicit measure assessed images of people with obesity and the other had images of people without obesity, which controlled for physical activity and ensured body size was the main difference in the images. In both studies, implicit evaluations of the images of people without obesity were more strongly positive than images of the people with obesity among research participants with no history of obesity. This could indicate a weaker association between the images of people with obesity and positive feelings, or a weaker belief in the proposition that people with obesity can be active.¹⁴ Either way, the results demonstrate bias in favor of images of physical activity with people who do not have obesity. However, the latter conjecture, that it is not believed that people with obesity can be active, may be interpreted as a form of confirmation bias (i.e., attending to information that supports preconceived beliefs²⁶). It is possible that participants without a history of obesity, because they do not have firsthand experience to counter commonly held stereotypes, defaulted to stigmatizing beliefs about people living with obesity. These participants may have been predisposed to consider people with obesity in a certain way, and in particular not as people who may engage in exercise, and thus had lower implicit and explicit evaluations. This finding supports the skepticism expressed by women with obesity that images such as those created by Obesity Canada will have any effect on weight stigma.¹⁰ The findings also corroborate the fear of women who experienced discrimination in physical activity settings that physical activity spaces may not be safe.¹⁰

Study 2 demonstrated that participants with no history of obesity who viewed a video that discussed physical activity but not obesity (i.e., the control video) followed by the images of people without obesity had the lowest explicit weight stigma. These participants also demonstrated the most positive implicit evaluations of the control images compared to the images of people with obesity, but this relationship did not differ by video or image condition. These findings are similar to other research that found nonoverweight people had higher explicit weight stigma after viewing images of people with obesity exercising compared to images of lean

people exercising.⁷ Others have suggested that having a family member with obesity may moderate weight stigma.⁹ That was found in the current study, extending the relationship to having a friend with obesity or obesity oneself. What is concerning about these findings is that being exposed to the antibias materials (whether it was the video or images) may have increased explicit weight stigma among participants with no history of obesity with obesity. This finding needs to be replicated because there was no pretest and so change cannot be assessed, but the finding would indicate that much more work is needed to influence weight stigma. It should be noted that the coding showed that the videos were largely positively received and only a small proportion expressed explicit disagreement with the message; thus most participants did not outright reject the message. Although the creation of non-stigmatizing images is laudable step, those who choose to use these images when promoting physical activity should take care to not inadvertently increase weight stigma. It may be a question of time: increased use of images that show diverse body sizes could start to normalize the idea that larger people are just as likely to be physically active.

Contrary to the hypothesized relationship, implicit evaluations of the images of people with obesity were not related to higher explicit weight stigma. This may be because the implicit measures used in this study had different stimuli than the explicit weight stigma measure. Participants responded to images as “good” or “bad” in the IATs, but they explicitly rated people with obesity on adjectives such as lazy, unattractive, or inactive. Thus, participants may have been reacting to different aspects of stigma and correspondence between implicit and explicit measures are higher when stimuli are similar.¹⁴ This is analogous to the example given by Gawronski and Hahn,²⁷ that implicit evaluations of race bias using black and white faces were not highly correlated with a questionnaire assessment of perceptions of racial discrimination. It may also be that the implicit evaluations captured more affective responses (via the emojis) whereas the questionnaire was a more cognitive appraisal of the characteristics of people living with obesity.²⁷ Further, the implicit evaluations did not differ by condition in study 2. This may indicate that the videos and images did not differently activate related associations or propositions.¹⁴ This again might be related to the stimuli used in the implicit measure. The results may also demonstrate the difficulty in changing implicit evaluations. However, changes in implicit evaluations have been shown after presentation of counter-attitudinal exercise information.²⁸ The focus in that study, though, was exercise, rather than obesity. Participants in the current study could have been focused on the body size of the images in the IAT rather than the activity. Berry²⁸ also reported ironic effects such that counterattitudinal information strengthened implicit evaluations as proposed by others.²⁹

This highlights one limitation of the current study: it did not include a pretest, and so, conclusions regarding change in evaluations cannot be made, but it may be that the implicit evaluations of the images of persons with obesity were weaker due to a similar ironic

effect. Another limitation, that is inherent to implicit measures, is that a given score cannot be used to categorize evaluations of people with obesity as, for example, very biased, somewhat biased, and so on.²⁷ Implicit measures are also context dependent, and given data were collected online, and it is unknown where participants were when they did the study. Other limitations of this study include a relatively young and well educated sample. Further, some technical issues in study 2 meant some of the data that could have added context to the findings was not used. It is also possible that activation of stereotypes of people living with obesity was stronger than activation of the positive exerciser stereotype, and future researchers may wish to include a third condition with negatively stereotypical images of people with obesity to determine if the images created by Obesity Canada elicit more positive evaluations of people with obesity more generally, independent of physical activity. This study also only included one questionnaire measure of weight stigma, and the effects of stigma, including differential and unfair treatment based on their body size,⁴ were not measured.

In conclusion, this research highlights that materials created to reduce weight stigma might not be effective among people with no history of obesity, either themselves or through a family member or friend. Based on these findings, intervention and health promotion researchers may wish to investigate if implicit evaluations can be targeted through training interventions such as evaluative conditioning, which may normalize the idea that people with obesity can be active.³⁰ They may also wish to target explicit stigma by pairing nonpejorative images with messages framing obesity as a disease⁸ or advocating for equal rights for people with obesity³¹ to see if the images in combination with such messages are more effective. Simply using the nonstigmatizing images is likely not yet enough.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in web sites of daily press used in the paper and from Government website.

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