

ORIGINAL ARTICLE

Warning labels on fashion images: Short- and longer-term effects on body dissatisfaction, eating disorder symptoms, and eating behavior

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Abstract

Objective: Fashion warning labels that caution readers about digitally altered images have been recommended and adopted by several countries to prevent body dissatisfaction and eating disorders. This study investigated the short- and longer-term influence of fashion warning labels on affect, body dissatisfaction, eating disorder symptoms, and snack consumption using a randomized-controlled experiment.

Method: Female undergraduates ($n = 118$) were randomized to view and rate responses to fashion images either with or without a warning label. They then consumed snacks and completed questionnaires. Sixty-four participants (54%) completed follow-up online surveys asking them to view and rate new fashion images with or without warning labels once per week for 4 weeks. Primary outcomes were affect, body dissatisfaction, eating disorder symptoms, and kilocalories consumed.

Results: Overall, fashion warning labels had no short-term effects on affect, body dissatisfaction, or kilocalories consumed in the lab. However, individuals who reported engaging in restrictive eating consumed fewer kilocalories when exposed to advertisements with warning labels ($M = 170.33$, $SD = 120.78$) versus no labels ($M = 286.46$, $SD = 166.30$), $p = .008$. Warning labels also had no protective effects after repeated exposure over 4 weeks on affect or eating disorder symptoms, and significantly increased appearance orientation ($p = .001$).

Discussion: Warning labels on media images are unlikely to be an effective policy tool to prevent negative affect, body dissatisfaction, and eating disorder symptoms, and, in some cases, may exacerbate these concerns.

KEYWORDS

body dissatisfaction, eating behavior, eating disorder symptoms, prevention, public policy, warning labels

1 | INTRODUCTION

Body dissatisfaction is common, with prevalence estimates ranging from 11% to as high as 72% among adult women in the United States (Fiske, Fallon, Blissmer, & Redding, 2014). This high prevalence has been attributed in part to sociocultural factors. The tripartite (Shroff & Thompson, 2006; Thompson, Coover, & Stormer, 1999) and dual-pathway (Stice, 2001; Stice & Agras, 1998) models posit that repeated messages from family, friends, and media idealizing thinness as the

standard of beauty elevate the pressure to be unrealistically and unattainably thin, leading to pervasive body dissatisfaction. Such body dissatisfaction, in turn, is a major risk factor for the development of eating disturbances and eating disorders (Stice, 2002).

Mass media play a particularly important role in the perpetuation of unrealistic thin ideals by emphasizing low body weight (Carrotte, Prichard, & Lim, 2017; Deighton-Smith & Bell, 2017; Ghaznavi & Taylor, 2015). Further, the common practice of digital alteration of media images has created even bigger gaps between actual and ideal body

shapes and sizes. Several meta-analyses have demonstrated small-to-moderate effect sizes of media exposure on body concerns, including body dissatisfaction, internalization of the thin ideal, and disordered eating behaviors (Ferguson, 2013; Grabe, Ward, & Hyde, 2008; Groesz, Levine, & Murnen, 2002; Hausenblas et al. 2013). Furthermore, these effects are moderated by preexisting risk, such as prior body dissatisfaction and low self-esteem (e.g., Ferguson, 2013; Hausenblas et al., 2013).

One policy that has been proposed to mitigate the negative effects of thin-ideal exposure on body concerns is the use of warning labels on media images to indicate when they have been digitally altered (Slater, Tiggemann, Firth, & Hawkins, 2012). Health warning labels have been widely used as public health measures to disclose health and safety information about other harmful products, and there is evidence suggesting their effectiveness in reducing cigarette and prenatal alcohol use (Al-hamdani & Smith, 2015; Hammond, 2011; Jung, 2016; Krischler & Glock, 2015; Villanti et al., 2014). Warning labels are an appealing strategy because they are relatively low cost and easy to implement and preserve people's freedom of choice (Mayer, Smith, & Scammon, 1991). One major U.S. pharmacy chain is proposing to use warning labels to alert consumers to airbrushed beauty advertisements (Engeln, 2018). Currently, several governments are promoting the use of these labels on media images. For example, Australia released the Voluntary Industry Code of Conduct on Body Image recommending disclosure of the digital alteration or enhancement of media images (National Advisory Group on Body Image, 2009). The Israeli government went further and now requires such disclosures as part of the "Photoshop Law" (Fantz, 2012). Great Britain's Royal Society for Public Health (2017) had recently urged for the adoption of warning labels on not only images used for advertisements, but all altered social media (e.g., Instagram). The fashion warning labels that have been studied typically include a statement that the images have been altered, (e.g., Ata, Thompson, & Small, 2013; Bury, Tiggemann, & Slater, 2016a, 2016b; Frederick, Sandhu, Scott, & Akbari, 2016; Tiggemann, Slater, Bury, Hawkins, & Firth, 2013) although some studies also included statements about the specific body parts that were altered (Tiggemann et al., 2013), that the alteration was geared toward perfection of physical appearance, and/or the negative implications of these alterations (e.g., Ata et al., 2013).

Although media warning labels are being recommended or used, the six studies that have examined this policy's effectiveness have yielded very little support for the use of warning labels. For example, Slater et al. (2012) reported that media warning labels prevented an increase in body dissatisfaction following exposure to photographs of thin female models. In contrast, several studies have found that warning labels on fashion images had either no effect on body dissatisfaction, or led to greater body dissatisfaction as compared to fashion images without warning labels (Ata et al., 2013; Bissell, 2006; Bury et al., 2016a, 2016b; Frederick et al., 2016; Tiggemann et al., 2013). Further, there is some evidence that warning labels may especially exacerbate body dissatisfaction among women who tend to compare their appearance to others (Tiggemann et al., 2013). One possible explanation for this backfire effect is that warning labels may direct increased attention to the idealized images (Tiggemann et al., 2013), and subsequently lead to greater negative outcomes (Harrison &

Hefner, 2014). These inconsistent and potentially harmful effects of warning labels raise concerns about whether this is an effective policy for ameliorating body image concerns and preventing disordered eating. However, there are a few important gaps in our understanding of how these labels influence people. First, prior studies have exclusively examined the short-term effects of warning labels after a single exposure, but it is unclear whether labels could help protect against increased body dissatisfaction with repeated exposures. Second, media warning labels are considered a tool for the prevention of eating disorders, but no studies have examined their influence on actual eating behavior. To address these gaps, we conducted a randomized-controlled experiment comparing the influence of fashion advertisements with or without warning labels on short-term snack consumption and short-and longer-term affect, body dissatisfaction, and eating disorder symptoms. On the basis of the existing literature, we hypothesized that exposure to fashion warning labels would increase short-and longer-term body dissatisfaction, eating disorder symptoms, and negative affect. We also hypothesized that exposure to warning labels would lead women with a tendency to restrict to eat fewer calories during a snack and those with a tendency to binge eat to eat more calories during a snack than those not exposed to warning labels.

2 | METHOD

2.1 | Participants

Female participants were recruited through flyers and email advertisements via undergraduate listservs at a private university. To conceal the study purpose, participants were recruited for a study assessing the relationship between imagination, creativity, and taste preferences; all participants were debriefed at the end. Inclusion criteria for this study were female, age between 18 and 25 years, and fluent in English. Participants were excluded if they were pregnant or reported allergies to any of the foods used in the study.

2.2 | Sample characteristics

A total of 118 females participated in the study (warning label condition: $n = 58$; control condition $n = 60$). Participants were young adults ($M = 20.54$, $SD = 2.13$) with an average BMI ($M = 22.13$, $SD = 3.39$), although the range was considerable (16.82 to 45.42 kg m^{-2} ; see Table 1). Forty-nine percent of the participants identified as White, 6% as African American, 11% as Hispanic, 30% as Asian or Pacific Islander, and 4% as Other. Baseline scores on the EDE-Q were comparable to established norms (Cash, 2000; Fairburn & Beglin, 1994). Although groups were randomized, individuals in the warning label group were significantly older ($p = .02$) had significantly higher EDE Global ($p = .02$), Restraint ($p = .003$), and Shape Concern ($p = .02$) scores at baseline; therefore, subsequent analyses controlled for age and EDE Global score. Follow-up data were available for 54.2% ($n = 64$; warning label condition: $n = 34$; control condition: $n = 30$) of the sample. Individuals who completed follow-up were slightly older ($M = 20.92$, $SD = 2.10$) than those who did not ($M = 20.09$, $SD = 2.09$), $t(116) = 2.14$, $p = .04$; otherwise, the participants completing

TABLE 1 Baseline sample characteristics by condition

	Warning label (n = 58) M (SD) or n (%)	Control (n = 60) M (SD) or n (%)	Test statistic t/ χ^2	p	Effect size d/w
Age (years)	20.07 (2.03)	21.00 (2.14)	2.42	.02*	0.45
Body mass index (BMI) (kg m ⁻²)	22.01 (2.17)	22.26 (4.28)	0.39	.69	0.07
Desired BMI (kg m ⁻²)	20.73 (1.92)	20.95 (2.72)	0.47	.64	0.09
Race/ethnicity	-----	-----	2.70	.61	0.15
White	28 (48.3%)	30 (50.0%)	-----	-----	-----
African American	4 (6.9%)	3 (5.0%)	-----	-----	-----
Hispanic	5 (8.6%)	8 (13.3%)	-----	-----	-----
Asian/Pacific islander	17 (29.3%)	18 (30.0%)	-----	-----	-----
Other	4 (6.9%)	1 (1.7%)	-----	-----	-----
EDE-Q global score	1.80 (1.06)	1.36 (0.91)	2.43	.02*	0.45
Restraint	1.55 (1.15)	0.99 (0.87)	2.99	.003*	0.56
Eating concern	1.02 (0.95)	0.74 (0.80)	1.79	.08	0.32
Shape concern	2.41 (1.27)	1.91 (1.25)	2.15	.03*	0.40
Weight concern	2.23 (1.39)	1.83 (1.31)	1.60	.11	0.30
MBSRQ-AS appearance evaluation	3.43 (0.83)	3.49 (0.85)	0.38	.70	0.07
MBSRQ-AS appearance orientation	3.37 (0.67)	3.36 (0.74)	0.07	.95	0.02
MBSRQ-AS body area satisfaction	3.23 (0.65)	3.44 (0.65)	1.72	.09	0.33
MBSRQ-AS overweight perception	2.52 (1.00)	2.24 (0.79)	1.66	.10	0.31
MBSRQ-AS self-classified weight	3.17 (0.49)	3.11 (0.59)	0.64	.52	0.11
Negative affect	3.02 (1.20)	2.69 (0.95)	1.66	.10	0.31
Momentary body dissatisfaction	4.09 (1.77)	4.67 (1.61)	1.86	.07	0.35
Binge eating (% yes, past month)	28 (48.3%)	18 (30.0%)	3.92	.06	0.18
Restrictive eating (% yes, past month)	22 (37.9%)	17 (28.3%)	1.24	.33	0.10
Dieting (% yes, currently)	10 (17.2%)	6 (10.0%)	1.24	.30	0.10

Note. EDE-Q = Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994); MBSRQ-AS = Multidimensional Body-Self Relations Questionnaire-Appearance Scales (Cash, 2000); *significant at $p < .05$.

follow-up did not differ significantly on condition or baseline variables compared to those who did not complete follow-up surveys.

2.3 | Procedures

This study was approved by the university's Institutional Review Board. There were two components to this experiment: (1) a baseline laboratory session; and (2) an online follow-up consisting of Qualtrics surveys emailed each week for 4 weeks following the laboratory session.

2.3.1 | Baseline laboratory session

Participants were asked to refrain from eating for 2 hr prior to coming to the laboratory. When participants arrived, they provided informed consent and were randomized to one of two conditions: (1) Warning label condition in which participants viewed fashion advertisements with warning labels indicating "Warning: This photograph has been altered in a manner that could promote unrealistic expectations of appropriate body image." This language was based on the American Medical Association's (2011) policy statement that discourages photography alterations in advertising (see Figure 1 for label image) or (2) Control condition in which participants viewed fashion advertisements without warning labels. Following randomization, participants were asked to complete a survey packet. First, they rated their initial affect and momentary body dissatisfaction (descriptions of all

measures appear below) and then answered a series of filler questions about their personal characteristics (see Supporting Information Appendix for all questions) as part of the study guise. Participants were then informed:

"You will now be asked to view a series of magazine images and answer questions about them. The image will appear for 10 seconds, and the questions will follow. Please click start when you are ready to proceed."

A series of ten fashion advertisements featuring women (the same ads were used for both conditions) was displayed on a computer screen and immediately after viewing each ad, they completed measures assessing their attitudes and affective response toward the advertisements. After viewing all ten images, a research assistant told participants:



FIGURE 1 Warning label displayed on fashion images in the warning label condition [Color figure can be viewed at wileyonlinelibrary.com]

"Now we would like to better understand how your processes of imagination and creativity may relate to sensory experiences such as taste. In a minute, I'll bring out several different snack foods. We would like you to take a taste of at least one of the foods, but please eat as much as you like since we will be asking you questions about the food afterwards."

Participants were then asked to view two neutral documentary video clips (about 9 min in duration) as part of the study guise while eating their snack. Participants were left alone to consume the snacks as they desired while watching the videos. They could take as much time as they wanted and were told to open the door to the room to signal when they were done. Following the snack, participants completed a final series of questionnaires that included assessments of their snack perceptions, affect, momentary and trait body dissatisfaction, and eating disorder symptoms. Participants were compensated with \$10 or course credit for their participation in this portion of the study.

2.3.2 | Longitudinal follow-up

Following the laboratory session, all participants were sent weekly emails for 4 weeks asking them to view an additional five fashion images via an online survey and rate their attitudes towards the advertisements. The instructions participants received for this portion of the study are included in the Supporting Information appendix.

The fashion images either did or did not display warning labels based on participants' initial randomization assignment. In the last follow-up survey, administered 4 weeks following the laboratory session, participants rated their advertisement reactions and completed measures of trait body dissatisfaction and eating disorder symptoms for a second time. Of the original sample, 64 participants (54.2%) responded and completed at least one of the follow-up surveys. Attrition rates were 41.4 and 50% for the warning label and control groups, respectively. Participants received a \$1 iTunes credit each time they completed one of the weekly surveys. At the end of the last survey, participants were provided a written debriefing statement explaining the purpose of the study.

2.4 | Measures

2.4.1 | Total kilocalories consumed

During the laboratory session, participants were given four identical bowls filled with the following snack foods: M&Ms (23 oz), Lay's potato chips (8 oz), grapes (20 oz), and baby carrots (24 oz) (all weights include the bowls). Participants were also given a plastic cup with 6 oz of water (including cup weight). The order in which the snacks were displayed on the table was randomized. Each food item was accompanied by an ingredients label to alert participants to potential allergies. Participants were provided with a standardized paper plate to use to eat their snacks. All food was weighed with an Ohaus digital scale accurate up to ± 0.1 g. Food was weighed out of participants' sight before and after the study to calculate amount consumed. The amount consumed and kilocalories (kcal) per serving listed on the nutrition facts label were used to calculate our primary eating behavior outcome of total kcals consumed. Having research

participants consume a snack or meal in the laboratory is an established and common method to assess eating behavior (e.g., Haynes, Kemps, & Moffitt, 2015; Kwan & Gordon, 2016; Tice, Bratslavsky, & Baumeister, 2001).

2.4.2 | Eating disorder symptoms

The Eating Disorder Examination-Questionnaire (EDE-Q, Fairburn & Beglin, 1994) was used to assess eating disorder symptoms at the end of the laboratory session and at the 4-week follow-up. The EDE-Q produces a global eating pathology score and four subscale scores: restraint, eating concern, shape concern, and weight concern. Higher scores represent greater eating disorder symptoms. This measure also provides frequency counts for several eating disordered behaviors, including binge eating. In this study, we dichotomized the binge eating variable to indicate if participants reported any episodes of binge eating within the past month (yes/no). The EDE-Q has shown good psychometric properties (Berg, Peterson, Frazier, & Crow, 2012). Internal consistency for the EDE-Q Global (Baseline: $\alpha = .93$; Follow-up: $\alpha = .95$) and subscale scores (Baseline: $\alpha = .76$ to $.90$; Follow-up: $\alpha = .78$ to $.92$) was acceptable to excellent in the current sample.

Because of the poor construct validity of commonly used restraint scales (Stice, Sysko, Roberto, & Allison, 2010), the Dietary Restriction Screener (DRS; Haynos & Fruzzetti, 2015) was used to measure self-reported restrictive eating at the end of the laboratory session. This is a single-item, dichotomous (yes/no) measure that asks, "In the last month, have you at any point engaged in restrictive eating?" An initial validation study found this measure to have good predictive validity for objective food intake (Haynos & Fruzzetti, 2015).

Binge eating during the test snack was also assessed by asking participants after the snack to report yes/no to the questions, "when you were eating the food, did you feel like you ate an unusually large amount of food?" and "when you were eating the food, did you experience a loss of control, like you couldn't stop eating once you started?" A yes response to both items was coded as a binge episode (either objective or subjective).

2.4.3 | Body dissatisfaction

The multidimensional body-self relations questionnaire-appearance scales (MBSRQ-AS; Brown et al., 1990; Cash, 2000) was used to assess dimensions of trait body dissatisfaction at the end of the laboratory session and at 4-week follow-up. This measure includes five subscales measuring different facets of body dissatisfaction, including: (a) appearance evaluation: positive appraisals of one's appearance (lower scores indicate more body dissatisfaction; Baseline: $\alpha = .90$; Follow-up: $\alpha = .90$); (b) appearance orientation: attention and importance placed on personal appearance (higher scores indicate greater importance of personal appearance; Baseline: $\alpha = .87$; Follow-up: $\alpha = .89$); (c) body areas satisfaction scale: degree of satisfaction with several specific aspects of appearance (lower scores indicate more body dissatisfaction; Baseline: $\alpha = .81$; Follow-up: $\alpha = .84$); (d) overweight preoccupation: concerns about one's body weight (higher scores indicate more weight preoccupation; Baseline: $\alpha = .77$; Follow-up: $\alpha = .75$); (e) self-classified weight: perceptions of one's body weight (higher scores indicate self-perception of higher weight;

Baseline: $\alpha = .81$; Follow-up: $\alpha = .82$). The MBSRQ-AS has shown adequate psychometric properties (Cash, 2000; Untas, Kolekt, Raschle, & Borteyrou, 2009). There is evidence suggesting that some of these subscales are less stable across a 2-week period (Nevill, Lane, & Duncan, 2015) and can be influenced by interventions (Bhatnagar, Wisniewski, Solomon, & Heinberg, 2013).

Additionally, momentary body dissatisfaction was assessed with a single item measured by a nine-point Likert scale (“How much do you like your body right now?”) administered at the beginning and end of the laboratory portion of the study.

2.4.4 | Affect

Negative affect was measured at the beginning and end of the baseline laboratory portion of the study using six emotion items assessed on a nine-point Likert scale (“Please use the scales below to describe yourself right now.”): anger, sadness, depression, bashfulness, hostility, and anxiety (Beginning of laboratory session: $\alpha = .75$; Conclusion of laboratory session: $\alpha = .81$). Positive affect was also assessed through three emotion items (happiness, joy, and pride); however, these scores were not analyzed due to poor internal consistency of the scale (Beginning of laboratory session: $\alpha = .46$; Conclusion of laboratory session: $\alpha = .45$).

2.4.5 | Advertisement reactions

After viewing each ad, participants completed 14 items assessing their advertisement reactions. Three of these questions measured participants’ attitudes toward an advertisement and associated brand and the other 11 items assessed their affective responses toward the advertisement.

Two of the three questions that measured consumer attitudes were adopted from the image assessment scale (Phelps & Thorson, 1991). These two questions were “How much did you like or dislike the magazine image” [1–7 Likert scale from dislike very much to like very much] and “How much do you like or dislike the brand that the image is promoting?” [1–7 Likert scale from dislike very much to like very much]. A third question was added to assess likelihood of purchasing the advertised item “How interested are you in purchasing this product after viewing the image” [1–7 Likert scale from very low purchase interest to very high purchase interest].

Participants were then prompted with the phrase, “did the advertisement make you feel...” and were given the following list of adjectives: depressed, worried, annoyed, discouraged, hopeful, amused, disgusted or grossed out, sad, angry, happy, and uneasy. These were rated on a 7-point Likert [1 = not at all; 4 = neutral; 7 = extremely]. The positive affect adjectives (happy, hopeful, and amused) were grouped into a positive affect score (Baseline: $\alpha = .80$; Follow-up: $\alpha = .63$ to $.84$), while the rest were grouped into a negative affect score (Baseline: $\alpha = .92$; Follow-up: $\alpha = .84$ to $.95$). A mean score was created by averaging positive (or negative) affective responses across the fashion advertisements.

2.4.6 | Food taste perceptions

Participants were asked to rate how much they liked the taste of each snack food on a Likert scale [1–9 from not at all to very much], which

did not significantly differ between the two warning label conditions. As filler questions, participants were also asked to rate how important the texture and colors of food were to them (see Supporting Information Appendix).

2.4.7 | Demographic questions

At the end of the laboratory session, participants indicated whether they were currently on a diet, their desired weight, race/ethnicity, age, and height and weight, which was used to calculate body mass index.

2.4.8 | Other questionnaires

Participants also completed a media consumption questionnaire (Stice, Schupak-Neuberg, Shaw, & Stein, 1994), an internet use questionnaire (Miller, 2008), and the Perceived Realism and Self-Relevance Questionnaire (Tiggemann et al., 2013) that were not analyzed as part of this project since they were not the primary outcomes of this study.

2.5 | Statistical analyses

Analyses were conducted using IBM SPSS Version 21. Baseline demographics and clinical characteristics were compared between groups using independent *t* tests and chi-square analyses, with the alpha set at $p < .05$ to identify potentially important covariates for subsequent analyses (please see Section 2.2). However, to control for multiple comparisons, alpha was set at $p < .01$ for all primary study analyses, prior to conducting analyses. All analyses used two-tailed tests.

2.5.1 | Laboratory session analyses

To examine the short-term influence of warning labels on reactions to fashion images, we conducted generalized linear models (GLM) with condition as the predictor variable. For normally distributed variables (i.e., liking image, liking brand, intention to purchase item) linear distributions were used and for positively skewed variables (i.e., positive and negative affective reactions to images) gamma with log link distributions were used. To examine the short-term influence of warning labels on affect and momentary body dissatisfaction, repeated measures analyses of variance (ANOVA) were conducted using change in momentary body dissatisfaction and negative affect ratings from the beginning and end of the experimental session as the outcomes, with condition as the between-subject predictor. To examine the short-term influence of warning labels on kcal intake, an additional GLM was conducted using a gamma with log link distribution to account for the positively skewed dependent variable of kcal intake, with condition as the predictor variable. Because both over- and under-eating can be forms of disordered eating, we conducted planned moderator analyses, to examine whether binge eating status (both within the past month and during the test snack) (yes/no) and restrictive eating status (yes/no) moderated the influence of warning labels on caloric intake.

2.5.2 | Longitudinal analyses

To examine affect in response to repeated exposure to fashion advertisements with warning labels, we conducted generalized estimating equations (GEE) with an autoregressive structure, using condition, time, and a condition by time interaction as predictors and affective

ratings in response to fashion advertisements at baseline and weeks one through four of follow-up as outcomes. GEE is ideally suited for examining longitudinal variables with multiple observations because of its tolerance for missing or unbalanced data (i.e., differing numbers of observations over time), due to the use of maximum likelihood analysis methods. To examine the influence of repeated exposure to warning labels on eating disorder symptoms and trait body dissatisfaction, which were only measured at two time points and therefore less appropriate for GEE, we conducted repeated measures ANOVAs using EDE-Q Global and subscale scores and MBSRQ-AS subscale scores at the baseline and 4-week follow-up, with condition entered as a between-subject predictor.

3 | RESULTS

3.1 | Short-term laboratory session results

There was no difference in caloric snack consumption between the warning label and control conditions (see Table 2). Thirty percent of the sample reported binge eating during the snack, and although those who reported binge eating consumed a greater amount during the snack ($M = 286.19$, $SD = 139.80$) than those not reporting binge eating ($M = 207.16$, $SD = 113.20$), this did not differ based on warning label condition, $Wald \chi^2(1) = 2.66$, $p = .10$. Similarly, self-report of binge eating within the past month did not significantly moderate the effect, $Wald \chi^2(1) = 1.77$, $p = .18$. In contrast, restrictive eating significantly moderated the effect, $Wald \chi^2(1) = 7.35$, $p = .007$ (see Figure 2). Individuals who reported restrictive eating on the DRS consumed significantly fewer kcals in the warning label ($M = 170.33$, $SD = 120.78$) compared to the control ($M = 286.46$, $SD = 166.30$) condition ($p = .008$, $d = .84$). Those who did not endorse restrictive eating consumed comparable amounts in the warning label ($M = 242.65$, $SD = 105.75$) and control ($M = 225.24$, $SD = 104.78$) conditions ($p = .56$, $d = .17$).

At baseline, the warning label and control conditions did not differ significantly in their advertisement reactions (see Table 2). In the overall sample, from baseline ($M = 2.85$, $SD = 1.08$) to the end of the laboratory session ($M = 2.45$, $SD = 1.12$), negative affect decreased slightly, $F(1,113) = 29.73$, $p < .001$, $d = .36$, but this did not vary significantly based on label condition. Momentary body dissatisfaction

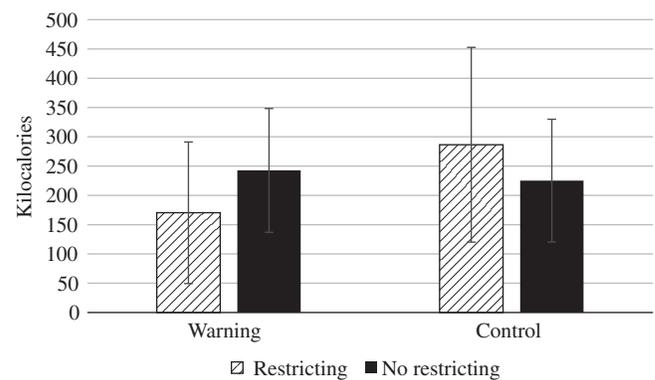


FIGURE 2 Generalized linear model using a gamma with log link distribution revealed an interaction effect between restrictive eating status and conditions (warning label vs. control group) on caloric snack consumption, $Wald \chi^2(1) = 7.35$, $p = .007$. Restrictive eating status was determined using the Dietary Restriction Screener (Haynos & Fruzzetti, 2015)

did not change over the laboratory session for individuals in either condition, $F(1,113) = 1.07$, $p = .30$.

3.2 | Longitudinal results

As displayed in Table 3, Global EDE-Q scores ($p = .001$, $d = .25$), Weight Concerns ($p < .001$, $d = .29$), and Shape Concerns ($p = .001$, $d = .26$) significantly decreased between baseline and 4-week follow up, but these changes did not vary significantly based on condition. Scores on MBSRQ-AS subscales also did not differentially change over time between groups, except for the appearance orientation scale ($p = .001$). Appearance orientation increased slightly from baseline to 4-week follow-up for those exposed to warning labels ($d = .25$), whereas it did not change for the control group ($d = .09$).

Across all assessment periods, individuals exposed to warning labels reported liking fashion images slightly less ($M = 4.10$, $SD = 0.83$) than those not exposed to warning labels ($M = 4.20$, $SD = 0.83$), $Wald \chi^2(1) = 7.43$, $p = .006$, $d = .12$. No statistically significant group differences were observed in changes in momentary liking of the fashion images, liking of the fashion brands, purchase intentions, and positive and negative affect towards the images with repeated exposure ($ps = .01$ to $.71$). All participants, regardless of condition, reported less liking of the fashion images ($Wald \chi^2(1) = 19.86$, $p < .001$) and brands

TABLE 2 Short-term laboratory findings in caloric consumption and advertisement reactions

	Warning label M (SD)	Control M (SD)	Test statistics		
			F/χ^2	p	d
Caloric intake	214.84 (117.42)	241.67 (133.75)	1.23	.27	.22
Advertisement reactions					
Liking fashion image	4.24 (0.75)	4.49 (0.65)	3.67	.06	.36
Liking fashion brand	4.24 (0.57)	4.39 (0.51)	3.67	.16	.25
Interest in purchasing item	3.14 (0.97)	3.44 (1.01)	2.69	.10	.31
Negative affect reaction	1.52 (0.59)	1.32 (0.42)	5.80	.02	.40
Positive affect reaction	2.06 (1.02)	2.40 (1.42)	2.59	.11	.28

*Significant at $p < .01$. p value adjusted for multiple comparisons.

Note. Advertisement reactions measured on 7-point Likert scales (1–7 from least agreement to most agreement); all analyses controlling for age and Eating Disorder Examination Global Score.

TABLE 3 Changes in eating disorder symptoms and body satisfaction from baseline to 4-week follow-up between warning label and control conditions

Dependent variable	Warning label (n = 34)		Control (n = 30)		Statistical test	
	Baseline M (SD)	4-week follow-up M (SD)	Baseline M (SD)	4-week follow-up M (SD)	Main effect of time	Time × condition interaction
EDE-Q global	1.59 (0.93)	1.42 (1.06)	1.41 (0.83)	1.11 (0.83)	$F(1,60) = 12.05, p = .001^*$	$F(1,60) = 0.56, p = .46$
EDE-Q restraint	1.39 (1.13)	1.18 (1.16)	0.87 (0.85)	0.74 (0.80)	$F(1,61) = 3.65, p = .06$	$F(1,61) = 0.34, p = .56$
EDE-Q eating concern	0.80 (0.73)	0.85 (0.86)	0.67 (0.67)	0.49 (0.49)	$F(1,61) = 0.74, p = .39$	$F(1,61) = 2.20, p = .14$
EDE-Q shape concern	2.23 (1.16)	1.95 (1.30)	2.09 (1.17)	1.73 (1.25)	$F(1,60) = 12.56, p = .001^*$	$F(1,60) = 0.13, p = .72$
EDE-Q weight concern	1.92 (1.25)	1.66 (1.30)	1.97 (1.25)	1.49 (1.27)	$F(1,61) = 17.64, p < .001^*$	$F(1,60) = 1.19, p = .28$
MBSRQ-AS appearance evaluation	3.43 (0.85)	3.45 (0.78)	3.48 (0.80)	3.34 (0.81)	$F(1,56) = 0.20, p = .66$	$F(1,56) = 0.73, p = .40$
MBSRQ-AS appearance orientation	3.25 (0.62)	3.40 (0.55)	3.28 (0.81)	3.21 (0.80)	$F(1,58) = 1.72, p = .20$	$F(1,58) = 13.11, p = .001^*$
MBSRQ-AS body areas satisfaction	3.35 (0.62)	3.32 (0.68)	3.31 (0.75)	3.24 (0.66)	$F(1,58) = 0.89, p = .35$	$F(1,58) = 0.08, p = .77$
MBSRQ-AS overweight preoccupation	2.44 (0.92)	2.46 (0.91)	2.16 (0.76)	2.30 (0.65)	$F(1,58) = 1.18, p = .28$	$F(1,58) = 0.44, p = .51$
MBSRQ-AS self-classified weight	3.09 (0.40)	3.06 (0.48)	3.34 (0.65)	3.29 (0.58)	$F(1,58) = 3.55, p = .07$	$F(1,58) = 0.19, p = .66$

*Significant at $p < .01$; p value adjusted for multiple comparisons.

Note. EDE-Q = Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994), measured on 7-point Likert scales (0–6 from no symptom to frequent occurrence of symptom); MBSRQ-AS = Multidimensional Body-Self Relations Questionnaire-Appearance Scales (Cash, 2000), measured on 5-point Likert scales (1–5 from definitely disagree to definitely agree); all analyses controlling for age.

(Wald $\chi^2(1) = 8.77, p = .003$) and reduced positive affective reactions to the advertisements (Wald $\chi^2(1) = 25.75, p < .001$) over time.

4 | DISCUSSION

In this study, we examined the influence of fashion warning labels on short- and longer-term affect, body dissatisfaction, and eating disorder symptoms and on short-term snack consumption. In line with existing literature, we found that warning labels had no short-term influence on negative affect (Slater et al., 2012) and momentary body dissatisfaction (Ata et al., 2013; Bury et al., 2016a; Frederick et al., 2016; Tiggemann et al., 2013). However, individuals exposed to fashion images with warning labels reported liking these images less in comparison to those not exposed to warning labels. Further, although warning labels did not influence short-term snack consumption on average, those individuals who reported engaging in restrictive eating in the previous month consumed fewer kcals when exposed to fashion advertisements with warning labels versus those without warning labels. This suggests the warning labels might have more adverse effects among the group of participants at the highest risk of disordered eating behavior. Participants in our study also exhibited an increase in the attention they pay towards their appearance after repeated exposures to fashion advertisements with warning labels. Although this increase by itself might not be problematic, there is evidence suggesting that appearance orientation is positively associated with and predictive of subsequent disordered eating (Pritchard, 2014; Zarychta, Mullan, Kruk, & Luszczynska, 2017).

Taken together, these results provide further evidence that warning labels on media images are likely to be ineffective at preventing affect disturbances, body dissatisfaction, and eating disorder symptoms, and may potentially increase aspects of appearance concern and induce high-risk individuals to restrict their food intake. These counterintuitive effects may be because the warning labels encourage greater visual attention to the models' bodies (Bury et al., 2016a) and

upward social comparisons (Tiggemann et al., 2013). Future studies should explore the mechanisms through which warning labels negatively influence individuals with disordered eating using eye tracking and memory tasks and examine whether labels can be constructed that do not have negative effects. Although the literature and results from the current study suggest that the negative influence of warning labels may only affect women with pre-existing risk (i.e., appearance orientation or restrictive eating), individuals with these characteristics may be most susceptible to developing an eating disorder, raising concerns about the practice of using warning labels to signal digital alteration.

Our study should be considered within the context of its limitations. First, the sample size was smaller for the longitudinal analyses, which could reduce confidence in some of the null effects observed. Second, the snack took place prior to the assessment of affect, momentary and trait body dissatisfaction, and eating disorder symptoms, making it difficult to isolate the effects of fashion image exposure (as opposed to eating) on affect, body dissatisfaction, and eating disorder symptoms. Third, although participants were repeatedly exposed to warning labels over 4 weeks, it is possible that a longer period is needed to observe the full range of effects of warning label exposures. Given that appearance orientation increased over 4 weeks of exposure to warning labels, it is possible that this could have a delayed impact on eating disorder symptoms. Further, because the longitudinal survey happened online, it is possible participants did not carefully view the images. Fourth, although binge eating did not moderate the effect of warning label conditions on caloric snack consumption, we did not specifically measure for objective binge eating in this study. It is possible that individuals who engage in objective binge eating may react differentially to the warning label conditions. Fifth, our sample was limited to young adult females, so we do not know whether the findings would generalize to other samples. Future studies should recruit more diverse samples and evaluate label exposure over a longer time period. Additionally, although we used a warning label with a phrase that is consistent with the American Medical

Association statement (2011), existing research had used different phrases (e.g., Ata et al., 2013; Slater et al., 2012; Tiggemann et al., 2013). Future research may consider comparing the effects of different phrases on fashion warning labels on eating disorder symptoms. Despite these limitations, our study has several strengths, including a randomized-controlled design, an assessment of both short- and longer-term effects of warning labels, and inclusion of psychological and behavioral outcomes.

In conclusion, the current study is the first to examine the short-term effects of fashion warning labels on actual food consumption and long-term effects on affect, body dissatisfaction, and eating disorder symptoms. There is a critical need for macro-level public health interventions for preventing the development of eating disorders (Austin, 2012). Our findings extend the results of previous research indicating that warning labels may not be effective at preventing disordered eating, and at worst, have unintended negative effects on eating disorder symptoms among specific groups. These findings highlight the need to evaluate well-intentioned eating disorder prevention policy ideas prior to implementation.

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