Focusing on media body ideal images triggers food intake among restrained eaters: A test of restraint theory and the elaboration likelihood model

Jessica A. Boyce *, Roeline G. Kuijer
Department of Psychology, University of Canterbury, Christchurch, New Zealand

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A B S T R A C T
Although research consistently shows that images of thin women in the media (media body ideals) affect women negatively (e.g., increased weight dissatisfaction and food intake), this effect is less clear among restrained eaters. The majority of experiments demonstrate that restrained eaters – identified with the Restraint Scale – consume more food than do other participants after viewing media body ideal images; whereas a minority of experiments suggest that such images trigger restrained eaters’ dietary restraint. Weight satisfaction and mood results are just as variable. One reason for these inconsistent results might be that different methods of image exposure (e.g., slideshow vs. film) afford varying levels of attention. Therefore, we manipulated attention levels and measured participants’ weight satisfaction and food intake. We based our hypotheses on the elaboration likelihood model and on restraint theory. We hypothesised that advertent (i.e., processing the images via central routes of persuasion) and inadvertent (i.e., processing the images via peripheral routes of persuasion) exposure would trigger differing degrees of weight dissatisfaction and dietary disinhibition among restrained eaters (cf. restraint theory). Participants (N = 174) were assigned to one of four conditions: advertent or inadvertent exposure to media or control images. The dependent variables were measured in a supposedly unrelated study. Although restrained eaters’ weight satisfaction was not significantly affected by either media exposure condition, advertent (but not inadvertent) media exposure triggered restrained eaters’ eating. These results suggest that teaching restrained eaters how to pay less attention to media body ideal images might be an effective strategy in media-literate interventions.

1. Introduction
Western women are bombarded with advertisements containing images of underweight fashion models (media body ideal images). Because most women have larger body-sizes than models have, a large percentage of women are dissatisfied with their bodies after viewing these images (Groesz, Levine, & Murnen, 2002). Moreover, in some circumstances, media body ideal images encourage young women to increase their intake of unhealthy food (e.g., Anschutz, Engels, Becker, & van Strien, 2009); and frequent thin-ideal media exposure has been connected to eating disorder symptomatology (e.g., Harrison, 2000). The tripartite influence model (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), aims to explain how socio-cultural influences (including the mass media) have their effect on outcomes such as body dissatisfaction and problem eating in women. According to this model, the mass media influences body dissatisfaction via thin-ideal internalisation and social comparison processes. Body dissatisfaction in turn is expected to trigger problematic eating tendencies (Keery, van den Berg, & Thompson, 2004). In line with this model, women with pre-existing appearance concerns have been found to consistently display negative effects (e.g., appearance dissatisfaction or increased food intake) after viewing media body ideals (e.g., Heinberg & Thompson, 1995; Monro & Huon, 2006).

1.1. Restrained eaters
Dietary restraint status has been examined as a variable that might magnify the negative effects associated with viewing media body ideals. Restrained eaters are constantly trying to limit their food intake (i.e., to diet) in order to change or manage their body weight (Lowe & Thomas, 2009). According to restraint theory (Polivy & Herman, 1985), successful dieting depends on demonstrating cognitive attention and cognitive restraint over one’s eating behaviour. However, the frequent demands placed on cognitive attention (e.g., stress, negative affect) are theorised to breakdown impulse control and trigger increased food intake and unsuccessful dieting. Indeed, restrained eaters who have been identified with Herman and Polivy (1980) Restraint Scale (RS) (the most commonly utilised restraint scale; Stice, Ozer, & Kees, 1997) alternate...
between periods of restraint and disinhibition, overeat when confronted with high calorie food or under stress, and tend to develop maladaptive associations with food (De Witt Huberts, Evers, & de Ridder, 2012; Polivy & Herman, 1999). Such alternation between periods of restraint and disinhibition promotes the development of problematic eating tendencies (Stice, Killen, Hayward, & Taylor, 1998). Hence, these restrained eaters are often characterised as unsuccessful restrained eaters.

As would be expected, restrained eaters are heavily invested in their body image, and report high levels of social comparison, thin-ideal awareness, and thin-ideal internalisation (e.g., Griffiths et al., 2000; Vartanian, Herman, & Polivy, 2005). Because restrained eaters have high BMIs (e.g., Boyce, Kuijer, & Gleiches, 2013), there is a large discrepancy between their own body-size and the body-size of underweight models. This discrepancy means that any social comparisons restrained eaters draw with images of thin women will be upward (i.e., comparing to a better-off target) (cf. social comparison theory; Festinger, 1954). Therefore, according to social comparison theory and the tripartite influence model, restrained eaters should display negative contrast effects (Thornton & Moore, 1993) after exposure to media body ideals (e.g., decreased weight satisfaction, mood, and/or increased food intake).

1.1. Media-related self-evaluations, mood, and food intake

Contrary to predictions based on social comparison theory and the tripartite influence model (see above), most studies report non-significant self-evaluation and/or mood effects among restrained eaters. That is, in these studies restrained eaters do not report feeling worse after exposure to media body ideals compared to other participants (e.g., Seddon & Berry, 1996; Strauss, Doyle, & Kreipe, 1994; Warren, Strauss, Taska, & Sullivan, 2005). Only one previous study found that restrained eaters’ weight satisfaction and (implicit) mood was negatively affected by viewing media body ideals (Boyce et al., 2013). Different from most other experimental studies, participants in this experiment paid a very high level of attention to the media (or control) images. Participants viewed a slideshow of advertisements and completed a memory recall test afterwards. Perhaps restrained eaters need to pay a relatively high level of attention toward media images to experience negative self-evaluative effects.

Studies examining the effect of viewing media body ideals on food intake also show mixed results. Although most studies find that restrained eaters indeed eat more than other participants (i.e., unrestrained eaters or restrained eaters in a comparison condition) after exposure to media body ideal images (Mills, Polivy, Herman, & Tiggemann, 2002; Seddon & Berry, 1996; Strauss et al., 1994; Warren et al., 2005), Boyce et al. (2013) found no significant differences between restrained and unrestrained eaters’ food intake.

Here, it is important to draw attention to the fact that different measures for restrained eating are used in the literature. The main difference between the RS and other restraint scales (e.g., DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986) is that in addition to items measuring dietary restraint, the RS also contains items that measure disinhibited eating (Lowe & Thomas, 2009). Studies that use other restraint scales (i.e., not the RS) generally find that restrained eaters do not disinhbit their food intake in response to viewing media body ideals (e.g., Anschutz et al., 2009). Because food intake results appear to differ by restraint scale, we used the RS (RS-CD) to identify restrained eaters and we focus on reviewing and comparing our hypotheses/data with other experiments that also used the RS.

To summarise previous studies, at odds with restraint theory (i.e., negative affect triggers disinhibition), those finding dietary disinhibition effects among restrained eaters do not obtain statistically significant negative self-evaluative/mood effects (e.g., Seddon & Berry, 1996; Strauss et al., 1994). Whereas, the one study finding no disinhibition effect, did obtain significant negative self-evaluative/mood effects (Boyce et al., 2013). An obvious difference between these distinct results was the level of attention participants were required to pay the experimental manipulation — the participants in Boyce et al. (2013) experiment paid a relatively higher level of attention to the images.

1.2. Paying attention to media body ideal images

The elaboration likelihood model (Petty & Cacioppo, 1981, 1986) is a dual process model of persuasion, and is used to predict the effectiveness of advertising (i.e., how persuasive the advertisement is in making consumers want to buy the advertised product). Although this model is used to predict how advertisements affect purchasing attitudes and behaviours, this model can also be used to predict the effect that advertisements have on participants’ attitudes and behaviours toward themselves (e.g., Withers & Wertheim, 2004). Therefore, the elaboration likelihood model may prove useful in predicting restrained eaters’ reactions to advertisements containing media body ideals.

The model posits that attitudes and behaviours are triggered by a central (thoughtful) route, or by a peripheral (less thoughtful) route of processing. A higher amount of thought (i.e., elaboration) via central routes of processing triggers stronger attitude and behaviour change (Rucker & Petty, 2006). Central (vs. peripheral) processing is more likely if the advertisement is deemed relevant to the participant, if there are few environmental distractions while processing the advertisement, and if the advertisement/message is repetitive (e.g., Cacioppo & Petty, 1979; Petty & Cacioppo, 1979; Petty, Wells, & Brock, 1976). Therefore, because thinness is relevant for restrained eaters, advertent and un-distracted exposure to repeated images of media body ideals should trigger their central processing of the images. In comparison, inadvertent/distracted exposure should trigger their peripheral processing.

1.2.1. Explaining restrained eaters’ self-evaluation, mood, and food intake

As mentioned, compared to peripheral processing, central information processing should lead to stronger effects of the message. Perhaps most previous media-related research failed to find negative self-evaluative effects among restrained eaters because restrained eaters did not pay the media images sufficient attention to encourage central information processing (e.g., Strauss et al., 1994; Warren et al., 2005).

Peripheral and central processing routes should also exert varying effects on restrained eaters’ food intake. Compared to other experiments, Boyce et al.’s (2013) methodology (i.e., memory test) would have triggered the strongest degree of central processing among restrained eaters, and it is the only study where restrained eaters (as assessed with the RS) did not overeat after viewing media body ideals. Post-hoc, Boyce et al. reasoned that the high level of media-related attention caused restrained eaters to negatively contrast their own body with the models’ bodies (e.g., weight dissatisfaction), which triggered goal-congruent dietary restraint (cf. control theory; Carver & Scheier, 1982). However, this rationale is at odds with past research. First, it is a central component of Polivy and Herman (1985) restraint theory that restrained eaters overeat after experiencing significant levels of negative affect and/or self-evaluations (e.g., Polivy & Herman, 1999). Second, goal-related negative affect is less likely to be used for self-regulatory purposes if one possesses low levels of self-efficacy (e.g., Van de Ven, Zeelenberg, & Pieters, 2011). Compared to unrestrained eaters, restrained eaters score highly on self-reported measures of ineffectiveness (Garner, Olmsted, Polivy, & Garfinkel, 1984) and rate themselves lower on measures of self-regulatory success in dieting (Nguyen & Polivy, 2014). Consequently, they will possess low levels of self-efficacy and it is unlikely that they would use strong negative self-evaluations or mood (which have been triggered by high media-related attention) to bolster their behavioural dietary restraint.

1.3. The present study

Our main aim was to manipulate media-related attention and to examine how being in different experimental conditions affected
restrained (and unrestrained) eaters’ weight satisfaction and food intake. Studying the effects of thin-media related attention will be helpful in understanding the mechanisms which trigger restrained eaters’ self-defeating dietary disinhibition.

Although other researchers have measured restrained eaters’ mood (e.g., Boyce et al., 2013; Warren et al., 2005), it is important to minimise demand characteristics in this area of research (i.e., when participants realise the constructs that are being measured and report negative media-related effects; Mills et al., 2002). Therefore, in an effort to design a valid experiment, the dependent variables were kept to a minimum. We measured weight satisfaction rather than mood because any negative contrast effects (Thornton & Moore, 1993) should at least emerge on the comparison value relevant/specific to the self, such as body-size or body-weight (cf. social comparison theory; Festinger, 1954).

In terms of the experimental manipulation, some researchers have varied the amount of social comparison that participants engage in when viewing media-related stimuli, thereby manipulating attention levels (e.g., Cattarin, Thompson, Thomas, & Williams, 2000). However, Want (2009) argued that explicit comparison instructions trigger deliberate (vs. automatic) comparisons, which might initiate self-defense thinking and lack real-world application. Although two attention-related experiments have already been conducted without social comparison instructions, their results are limited because the inadvertent exposure was subliminal (i.e., too inadvertent; Jansen & de Vries, 2002), or because participants’ restraint status was not measured (Brown & Dittrmann, 2005).

We developed four experimental conditions in the current study: advertent exposure to media or control images, or inadvertent exposure to media or control images. Rather than expose some participants to a slideshow (i.e., advertent exposure in past experiments; Monro & Huon, 2006) and some to a film (i.e., inadvertent exposure in past experiments; Strauss et al., 1994), the stimuli were kept constant between the attention conditions. All participants were exposed to exactly the same slideshow (media body ideals vs. control). We tested for a series of 3-way interaction effects with dietary restraint status moderating the relationship between the outcome variable (weight satisfaction or food intake), the prime condition variable, and the attention condition variable. Because restrained eaters have pre-existing appearance concerns and have internalised the thin-ideal body type (cf. tripartite influence model) we hypothesised that advertent (central processing) and inadvertent (peripheral processing) media exposure would trigger differing degrees of their weight dissatisfaction and disinhibited food intake — i.e., a negative contrast effect. To clarify our food intake hypothesis, although some research suggests otherwise (Boyce et al., 2013), we predicted disinhibited rather than inhibited food intake because: (a) restraint theory predicts that restrained eaters will lose dietary control after/while experiencing negative affect (Polivy & Herman, 1985, 1999), and (b) only individuals who are high in self-efficacy are likely to use goal-related negative affect (e.g., weight dissatisfaction) to their self-regulatory advantage (cf. control theory; e.g., Van de Ven et al., 2011). Therefore, based on the elaboration likelihood model, restrained eaters who are advertently exposed to media images should exhibit magnified negative effects (weight dissatisfaction and disinhibited food intake); whereas restrained eaters inadvertently exposed to the images should also exhibit these negative effects, but the effects should be nullled and possibly non-significant.

2. Method

2.1. Participants

Data were collected in three phases. Two hundred and ninety-one female university students completed an online questionnaire (Phase 1), with 249 continuing to complete Phases 2 and 3 in the laboratory. Participants who continued past Phase 1 did not differ (age, baseline weight satisfaction, or restraint status) significantly from participants who did not continue past Phase 1 (all ts < 0.55, ps > .58).

Because obese participants react differently to anticipatory food intake (Stice, Spoor, Ng, & Zald, 2009), data from 26 participants (BMI ≥ 30) were not analysed. Data from a further 49 participants were also removed; these were 20 participants in the inadvertent-attention condition who rated their attention to the prime images as 0/10 (i.e., they did not see any of the images in the slideshow) and 29 suspicious participants. Although no participant correctly understood the purpose of the experiment or connected the two unrelated studies during post-experiment questioning (see below), these 29 participants were suspicious of the taste test and/or the dieting content in the questionnaire. Following Mills et al. (2002), such data were not analysed in an attempt to reduce demand characteristics. Participants (N = 174) had a mean age of 20.43 (SD = 6.29), and mean BMI of 23.06 (SD = 2.75). Seventy-nine-percent of the sample identified themselves as New Zealand European, 5% as Chinese, 5% as New Zealand European and New Zealand Māori, 2% as Indian, and the remaining 9% were of other self-reported ethnicities (e.g., Australian).

Participants were randomly assigned to either the advertent (n = 96), or inadvertent (n = 78) attention conditions. Within the advertent condition, 49 participants were assigned to the control condition, and 47 to the media condition. Comparatively, in the inadvertent condition 39 participants were randomly assigned to each of the experimental conditions. To ascertain if random assignment was successful, a series of 2 (attention condition variable) × 2 (prime condition variable) ANOVAs were conducted with baseline variables as the outcome measures. Participants assigned to the advertent- and inadvertent-attention conditions did not differ significantly in BMI, restraint status, or pre-manipulation weight satisfaction. However, participants in the advertent condition were significantly [F(1, 170) = 7.12, p = .01, ηp2 = .04] older (M = 21.56) than were those assigned to the inadvertent condition (M = 19.04). Moreover, those assigned to the media condition were significantly [F(1, 170) = 6.01, p = .02, ηp2 = .03] more satisfied with their weight (M = 6.00) and scored significantly [F(1, 170) = 4.79, p = .03, ηp2 = .03] lower on the measure of dietary restraint (M = 7.01) than were those assigned to the control condition (Mweight-satisfaction = 5.11, Mrestraint = 8.15). Furthermore, the attention and prime condition variables significantly interacted [F(1, 170) = 4.64, p = .03, ηp2 = .03] to predict BMI. Of the participants in the media conditions, those in the advertent condition had lower BMIs (M = 22.46), than participants assigned to the inadvertent condition (M = 23.54). Conversely, of those participants assigned to the control conditions, the average BMI was lower in the inadvertent condition (M = 22.78), compared to the advertent condition (M = 23.49).

Because age, restraint, BMI, and pre-manipulation weight satisfaction were unrelated to the food intake variables, they were not entered as covariates in the analyses with sweet and savoury food intake as the dependent variables (see Stevens, 1996; Tabachnick & Fidell, 2001, for a discussion on best practice of including covariates into regression analyses). Weight satisfaction, restraint, and BMI all correlated significantly with post-manipulation weight satisfaction (see Table 1). Therefore, both BMI and pre-manipulation weight satisfaction (tolerance statistic = .68) were entered as covariates in the regression model with sweet and savoury food intake as the dependent variable (restraint is already included as a predictor).

2.2. Procedure

This experiment received human ethics approval from the appropriate committee. Undergraduate students were offered course credit to complete the study. In Phase 1 (of 3), participants completed an online pre-test questionnaire for the study entitled Personality and the Five Human Senses. Here, participants completed filler items (e.g., five senses), the RS, and one item measuring pre-manipulation weight satisfaction. Participants also completed Stice (1998) Dietary Intent...
2.2.1.2. Phase 2 advertent-attention condition.

After consenting to participate in the Five Senses study (Phase 3), the experimenter mentioned that a friend needed extra participants for a Coping Skills and Task Performance study (Phase 2) for which they would receive a café voucher. Consenting participants (99.5%) were provided with a questionnaire booklet. The first part of the booklet was identical for all participants; they completed demographic questions and a filler scale on coping styles (the Brief COPE; Carver, 1997). Two-weeks after completing the pre-test questionnaire, participants individually came to the laboratory to complete the study. Because demand characteristics confound similar experiments (Mills et al., 2002), we developed a two-study cover story. Before beginning the Five Senses study (Phase 3); participants were given the option to complete an unrelated study (Phase 2).

2.2.2. Phase 3

At the start of Phase 3 participants were randomly assigned to one (e.g., sight, taste etcetera) of the sensory conditions (e.g., Anschutz, van Strien, & Engels, 2008). They pulled one piece of paper out of a hat containing five pieces of paper, one piece for each of the human senses. In reality, all pieces of paper assigned participants to the “taste condition”. Participants then received a “taste” questionnaire booklet and – while the experimenter set up the taste test on a separate desk – began by rating their hunger and post-manipulation weight satisfaction. The experimenter left the room while participants completed the taste test. Upon returning to the room, the experimenter removed the food and asked participants to complete their questionnaires (i.e., filler items about “taste”). Finally, the experimenter weighed the participants and measured their height (BMI was calculated: kg/m²).

Before debriefing participants about the experiment, the experimenter asked how much attention (0–10) they had paid to the slideshow. We used this data for the manipulation-check and for the cut-off criteria (i.e., attention ≥ 1). The experimenter also asked participants what they thought the study was about. This question was used to rate participants’ level of suspicion about our cover story and outcome measures. Participants were coded as suspicious (1 vs. 0) if they took note of the diet content in the questionnaire, and/or taste test, and/or the content of the slideshow.

2.3. Measures

2.3.1. Dietary restraint status

Although participants completed Herman and Polivy’s (1980) 10-item RS, only the 6-item concern for dieting subscale (RS-CD; e.g., do you give too much time and thought to food) was analysed. We chose to follow contemporary restraint researchers (e.g., Veling, Aarts, & Stroebel, 2011) who eliminate the weight-fluctuation subscale (RS-WF) because it has low internal consistency, is confounded with weight-status, and does not measure eating behaviours (Dinkel, Berth, Exner, Rief, & Balck, 2005; Stroebel, 2008). In the present study, the RS-CD had a Cronbach’s α of .81. The second restraint scale (DIS; Stice, 1998) that was included for exploratory purposes had a Cronbach’s α of .88.

2.3.2. Weight satisfaction

On a 10-point scale (1 = not at all satisfied, 10 = very satisfied) participants responded to the question: “how satisfied are you with your weight”.

2.3.3. Hunger

Participants marked a visual analogue scale: not hungry–extremely hungry.
2.3.4. Food intake

Food intake was measured with a 10-minute taste test. To avoid participants developing suspicion about the study, we did not ask them to refrain from eating prior to the experiment (e.g., Strahan, Spencer, & Zanna, 2007). Instead, participants were scheduled during “normal” snacking hours (11 am–6 pm) and hunger was measured prior to the taste test as a potential covariate. Participants thought that the taste test was being used to explore the link between their personality and taste perceptions. They received a large glass of water and four (counterbalanced) bowls of unhealthy food: salted pretzel bowls, savoury crackers, chocolate/peanut M&Ms, and bite-sized cookies. Participants rated (1 = certainly not, 7 = certainly yes) each food on 13 taste dimensions (e.g., this food is salty), then–to encourage food intake–ranked each food from most, to least, favourite. Before leaving the room, the experimenter ensured that participants understood how to rate each bowl of food sequentially and that they could eat as much as was necessary to provide accurate ratings. Each bowl was weighed before and after the taste test.

Because each of the four foods was different in weight, the grammes consumed from each bowl were standardized prior to analyses (Evers, Stok, & de Ridder, 2010). These standardized data were used in all analyses (e.g., regressions), but for ease of interpretation, raw data were used to calculate the descriptive statistics and to construct figures. Furthermore, viewing media body ideals can have significantly different effects on sweet and savoury food intake (Monro & Huon, 2006), and participants respond differently to sweet and savoury foods when they are under stress (Dube, LeBel, & Lu, 2005). Therefore, cookie and M&M intake were combined to form a sweet intake variable, and pretzel and cracker intake were combined to form a savoury intake variable.

2.4. Analyses

Hierarchical Multiple Regression (HMR) analyses were used to probe for the presence or absence of statistically significant main effects (prime condition variable, attention condition variable, centred restraint status variable), 2-way interaction effects (prime × restraint, attention × restraint, prime × attention), and the hypothesised 3-way interaction effect (prime × attention × restraint) on all three outcome measures. Any covariates (e.g., pre-manipulation weight satisfaction) were entered in Step 1, main effects in Step 2, 2-way interaction effects in Step 3, and the hypothesised 3-way interaction effect in Step 4. We achieved sufficient power (90%) to detect medium-sized 3-way interaction effects with alpha set at .05 (Faul, Erdfelder, Buchner, & Lang, 2009). Simple slopes were constructed to probe any statistically significant interaction effects.

3. Results

3.1. Preliminary analyses

Descriptive statistics and correlations are presented in Table 1. Pre- and post-manipulation weight satisfaction correlated highly and positively. Likewise, sweet food intake correlated positively with savoury food intake. RS-CD scores correlated positively with BMI, and negatively with pre- and post-manipulation weight satisfaction. BMI also correlated negatively with pre- and post-manipulation weight satisfaction. Furthermore, self-reported hunger levels correlated positively with weight satisfaction (pre- and post-manipulation). Therefore, in addition to controlling for BMI and pre-manipulation weight satisfaction in the analyses with post-manipulation weight satisfaction as the dependent variable, we also controlled for hunger levels (tolerance statistics > .64). In addition, hunger was entered as a covariate in the analyses with savoury food intake as the dependent variable, but – because it was not significantly correlated with sweet food intake – not in the analyses with the sweet food intake dependent variable (cf. Tabachnick & Fidell, 2001).

3.2. Manipulation check

The attention manipulation was successful, t(172) = 26.32, p < .001, r² = .80. Participants in the inadvertent condition rated their attention to the images higher (M = 7.86, SD = 1.19), than did those in the inadvertent condition (M = 2.83, SD = 1.33).

3.3. Main analyses

Three HMR analyses (Table 2) were conducted to test for any statistically significant main and interaction effects. The data set did not contain any outliers (data points greater than three standardised residuals from the regression line with a Cooks Distance greater than one; Newton & Rundestam, 1999). Furthermore, because the covariates (e.g., hunger) did not significantly interact with the manipulation conditions (covariate × prime condition variable; covariate × attention condition variable; covariate × prime condition variable × attention condition variable) to predict weight satisfaction or savoury food intake (ps > .11), the homogeneity of regression slopes assumption was not violated.

3.3.1. Weight satisfaction

After controlling for pre-manipulation weight satisfaction, BMI, and hunger there was no significant relationship between restraint scores and post-manipulation weight satisfaction (Step 2, R² = .05). Similarly, adding the 2-way (Step 3, R² Δ < .01, p = .61) and 3-way interaction effects (Step 4, R² Δ < .01, p = .43) to the model did not account for an additional amount of significant variance in weight satisfaction. The hypothesised 3-way interaction effect remained non-significant when substituting RS-CD scores for DIS scores (R² Δ < .01, p = .13).

Table 2

<table>
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<th>Weight satisfaction</th>
<th>R²</th>
<th>Δ</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>b</th>
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<td>.10</td>
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<td>3 Prime × RS-CD</td>
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<td>3 Prime × attention × RS-CD</td>
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<td>0.31</td>
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Note. Apart from the R² Δ values, all other values are taken from the last step of each analysis. The degrees of freedom differ between models because of the number of covariates or missing data.

* p < .05.
** p < .01.
*** p < .001.
3.3.2. Sweet food intake

The relationship between restraint scores and sweet food intake during the taste test was marginally significant (Step 1 $\beta = .14$, $p = .08$). Entering the 2-way interaction effects into this model did not account for an additional significant amount of variance in sweet food intake (Step 2 $R^2 \Delta = .02$, $p = .27$). However, in Step 3 the 3-way interaction accounted for an additional 5% of the variance ($p = .01$).

This interaction effect is presented in Figs. 1 and 2. In the advertent-attention condition (Fig. 1), the interaction between restraint score and the prime condition variable was marginally significant ($R^2 \Delta = .03$, $p = .10$). As hypothesised, simple slope analyses showed that there was a statistically significant positive relationship between restraint scores and sweet food intake in the media condition ($\beta = .34$, $t = 2.43$, $p = .02$). This effect was not statistically significant in the control condition ($\beta = -.01$, $t = -0.05$, $p = .96$). Similarly, restraint scores interacted significantly with the prime condition variable in the inadvertent-attention condition ($R^2 \Delta = .08$, $p = .02$) (Fig. 2). In the inadvertent control condition, the relationship between food intake and restraint scores was positive and significant ($\beta = .31$, $t = 2.03$, $p = .04$). The opposite, but non-significant, relationship emerged in the inadvertent media condition ($\beta = -.25$, $t = -1.47$, $p = .15$).

The 3-way interaction effect for this model reached a marginal level of statistical significance when RS-CD scores were replaced with DIS scores ($R^2 \Delta = .02$, $p = .07$). However, the interaction between the prime condition variable and the DIS was non-significant in both the inadvertent and advertent conditions (both $R^2 \Delta < .04$, $ps > .13$).

3.3.3. Savoury food intake

Participants approached the savoury food differently. First, restraint scores were not significantly related to savoury food intake (Step 2 $\beta = .07$). Second, entering the 2-way interaction effects into Step 3 of the model accounted for a statistically significant 5% of variance ($p = .04$). Inspection of Step 3 statistics (not displayed in Table 2) showed that the attention condition variable interacted with the prime condition variable ($F = 8.01$, $\beta = -.36$, $b = -1.18$, $p = .005$). Further analyses demonstrated that after controlling for hunger levels, the amount of savoury food participants ate in the inadvertent-attention condition depended on the slideshow that they had been exposed to, $F(1,74) = 5.76$, $p = .02$, $\eta^2 = .07$. Participants inadvertently exposed to the media slideshow ($M = 10.83$) ate significantly less than did those exposed to the control slideshow ($M = 15.60$). In contrast, seeing different experimental prime images did not significantly influence how much food participants in the advertent condition ate, $F(1,84) = 1.88$, $p = .17$, $\eta^2 = .02$. Participants ate similar amounts in the media ($M = 14.13$) and control conditions ($M = 11.59$). This 2-way interaction effect was not qualified by the hypothesised 3-way interaction entered in Step 4 ($R^2 \Delta < .01$, $p = .43$). Furthermore, when RS-CD scores were substituted for DIS scores, the 3-way interaction effect predicting savoury food intake remained non-significant ($R^2 \Delta < .01$, $p = .92$).

3.4. Additional analyses

To examine whether any of the results changed when participants with BMIs $\geq 30$ ($N = 26$) or suspicious participants ($N = 29$) were included in the analyses, the main analyses were conducted again including these participants. None of the results changed when obese participants were included. However, the 3-way interaction effect for sweet food intake became non-significant when suspicious participants were included ($R^2 \Delta = .02$, $p = .64$).

4. Discussion

In the current experiment, we hypothesised that negative media-related effects (weight dissatisfaction and food intake) would be magnified when restrained eaters paid a high level of attention to the images (i.e., central processing), but be minimal and possibly non-significant when they paid a lower level of attention to the images (i.e., peripheral processing). However, neither form of media exposure triggered statistically significant amounts of restrained eaters' weight dissatisfaction. Nevertheless – compared to unrestrained eaters and compared to restrained eaters in the inadvertent media condition – as hypothesised, restrained eaters ate more high-calorie (sweet) food when they had been placed in the advertent media condition. This food intake effect is consistent with the elaboration likelihood model. That is, central information processing/advertent attention triggered a stronger behavioural effect than did peripheral processing. However, because restraint theorists would argue that negative self-evaluation (which was non-significant in the current study) triggered such increased food intake, the food intake effect appears to be inconsistent with restraint theory.

4.1. Restrained eaters’ weight satisfaction

Although inconsistent with our hypothesis, the non-significant weight dissatisfaction effect aligns with the majority of previous research in this literature (e.g., Seddon & Berry, 1996). However, to now conclude that restrained eaters do not experience negative self-evaluative effects may be premature. In an effort to minimise demand characteristics in the current study, the weight satisfaction measure only consisted of one item. Perhaps a multi-item scale would have been more sensitive to detect changes in weight-satisfaction levels.
is also noteworthy that Boyce et al. (2013) included a measure of implicit mood in their experiment and obtained statistically significant negative results. Perhaps implicit measures have more statistical power in experiments that are plagued by demand characteristics (Mills et al., 2002) and – although excluded for previously outlined reasons – we should have included a more implicit measure of mood and/or self-evaluation (see also Boyce, Martens, Schimel, & Kuiper, 2012). Therefore, we cannot conclusively state that our experimental manipulations did or did not affect restrained eaters’ weight satisfaction; rather, our one-item measure may have been limited in its statistical sensitivity.

4.2. Restrained eaters’ food intake

As hypothesised, concentrating on images of thin women encouraged restrained eaters to consume a higher quantity of unhealthy snacks than some other participants consumed. It is noteworthy that this effect only emerged for the sweet food items and not for the savoury food items, as sweet foods are often used for negative- affect regulation (Dube et al., 2005). Although restrained eaters’ food intake in the advertent media condition (M = 39 g) was consistent with the hypothesis, we did not expect their food intake in the inadvertent media condition to be so low (M = 25 grams). This result was inconsistent with previous research wherein restrained eaters paid small amounts of attention to the media images and ate more snack food than did other participants (Strauss et al., 1994; Warren et al., 2005). Perhaps our results differed from Strauss et al.’s (Strauss et al., 1994; Warren et al., 2005) results because their experimental manipulation and food intake measure were very different from our own. It is likely that participants in our inadvertent condition paid much less attention to the prime images than did participants in Strauss et al.’s experiments who viewed commercials (containing thin women) incidental to a film clip. That is, although such viewing was not strictly advertent (i.e., participants were not told to memorise the images), the commercials/images were novel to the film clip and would have been a focus of participants’ attention. Consequently, the images in Strauss et al.’s experiments may have been processed along more central, rather than peripheral routes of persuasion. Perhaps our inadvertent condition was too inadvertent and almost subliminal — a form of media attention that does not affect restrained eaters’ self-evaluation, mood, or food intake (Jansen & de Vries, 2002).

The eating environment also differed between the current study and Strauss et al.’s experiments (Strauss et al., 1994; Warren et al., 2005). Participants in the current experiment completed rating scales about the foods and were very aware of their food consumption (i.e., taste test). In comparison, those in Strauss et al.’s experiments consumed food while they watched the designated film and commercials (i.e., consumption occurred during the experimental manipulation). It is noteworthy that participants who are distracted by film-viewing tend to eat more food than do non-distracted participants (Long, Meyer, Leung, & Wallis, 2011), and that those who score highly on the RS are especially vulnerable to overeat while they are distracted (Boon, Stroebe, Schut, & Jientema, 2002). Perhaps, together with viewing the images of thin women, the distracted eating environment encouraged restrained eaters’ eating in Strauss et al.’s experiments. Future researchers should test the combination of participants’ restraint status, media-related attention, and eating-attention to predict their food intake.

4.3. Unrestrained eaters’ food intake

Restrained and unrestrained eaters were differently affected by the media body ideal images. As discussed, restrained eaters consumed a low quantity of food in the inadvertent media condition, but consumed a higher quantity in the advertent media condition. In contrast, unrestrained eaters ate a low quantity of food when viewing media images adversely (and when viewing control images advertently and inadvertently), but consumed a relatively high quantity of food after viewing the media images inadvertently.

Restrained and unrestrained eaters’ media-related eating behaviour is directed by different mechanisms. Restrained eaters make upward social comparisons with underweight media models when they concentrate on the images because their own body size is highly discrepant from a models’ body size. In turn, presumably such upward comparisons trigger negative contrast effects (Thornton & Moore, 1993) and overeating (cf. restraint theory). However, it is likely that unrestrained eaters draw different comparisons with underweight fashion models. Compared to participants who score high on the RS, those who score lower on the scale have lower BMIs and are more satisfied with their body-size (Boyce et al., 2013; Mills et al., 2002). On the one hand, a quick glance at thin women (i.e., inadvertent media exposure) might briefly remind unrestrained eaters how satisfied they are with their own body-size, and they consequently feel more relaxed than other participants feel about eating a relatively high amount of unhealthy food. On the other hand, directing more advertent attention toward the images might give these unrestrained eaters time to conjure self-regulatory thoughts — e.g., I like my body-size; my body-size is similar to these women’s body-size (i.e., the fashion models) because I have self-control, therefore I will limit my intake of this unhealthy food. In any event, these results highlight that unrestrained eaters are an interesting population of women that largely go unnoticed in the literature.

4.4. Implications

Advertent media exposure encouraged restrained eaters to eat unhealthy food. Such alternation between periods of dietary restraint and disinhibition can foster disordered eating behaviours (Stice et al., 1998). Therefore, interventions and educators need to teach restrained eaters how to pay less attention to images of underweight women in the media. Many interventions have already been developed to reduce the experience of negative self-evaluative effects. Media-literacy and media-modification interventions aim to reduce the credibility of media images by encouraging women to view the images critically and to recognise any digital modifications (e.g., photoshopping) within the image (e.g., Irving & Berel, 2001; Want, Vickers, & Amos, 2009). Similarly, adding warning labels (or disclaimers) to the advertising image is becoming popular (e.g., “this image has been digitally altered to smooth skin tone and slim arms and legs”; Tiggemann, Slater, Bury, Hawkins, & Firth, 2013, p. 47). However, currently these techniques have had varying and sometimes detrimental effects on young women (Irving & Berel, 2001; Tiggemann et al., 2013). Perhaps these warning labels and intervention techniques actually encourage detrimentally high levels of media-related attention and social comparison (cf. Tiggemann et al., 2013). Considering the current results, unless notably amended, such strategies should not be used to modify restrained eaters’ media-related eating behaviour.

Alternatively, Papis and Nicolajie (2012) have suggested tailoring implementation intentions to modify young women’s responses to media body ideal images. Implementation intentions are specific ‘if–then’ plans that successfully modify behaviours (Gollwitzer, 1999). For example, restrained eaters might form a plan: If I notice an advertisement with a thin woman in it, then I will turn away and think about x. In addition, though usually applied to stress-related interventions (Baer, 2003), mindfulness is another technique that may prove useful in reducing media-related attention. Mindfulness interventions teach skills of attentional control and focus that could be tailored to the needs of restrained eaters. Mindfulness also teaches participants to recognise and amend negative thought processes (e.g., Segal, Williams, & Teasdale, 2012). Although yet to be tested, it is likely that the relationship between advertent media exposure and restrained eaters’ self-evaluations, mood, and eating behaviours are mediated by...
dysfunctional cognitions (e.g., fat talk; Tucker, Martz, Curtin, & Bazzini, 2007). Therefore, the ability to recognise that such thoughts are just thoughts (e.g., Segal et al., 2012) may be a useful strategy for restrained eaters who have not mastered actually shifting their attention away from the media images.

4.5. Strengths and limitations

Our experiment contained a number of strengths. Similar to recent research (e.g., Anschutz et al., 2008) – because of the debate surrounding the measurement of dietary restraint (Lowe & Thomas, 2009) – we checked our hypothesised effects with two restraint scales. Although the 3-way interaction effects remained relatively similar, it is noteworthy that the statistically significant food intake effect reduced in strength when we substituted the RS-CD measure with the DIS. This result implies that media-related disinhibition effects are more prominent among relatively unsuccessful restrained eaters (i.e., those identified with the RS). Furthermore, the current experiment was strengthened by our careful design (e.g., cover story, two-study pretest) and minimisation of demand characteristics.

Nevertheless, the experiment was also limited. It was our intention to design the inadvertent attention condition with real-world applicability. We intended participants’ attention levels to be similar to their attention levels while flicking through a magazine. However, as mentioned, this attention condition might have been too inadvertent. Twenty participants from the inadvertent condition did not notice the experimental manipulation (i.e., slideshow) and had to be excluded from the analyses. In addition, because we did not measure implicit mood or implicit self-evaluation, the results and corresponding interpretation of restrained eaters’ behaviour was limited. Future researchers should attempt to improve the inadvertent condition, replicate the methodology, and incorporate outcome measures of implicit mood or self-evaluation (e.g., Boyce et al., 2012, 2013), and an improved measure of weight or body satisfaction (e.g., Garner, 1991).

5. Conclusion

Our experiment marks the beginning of a new phase of research. Without accounting for attention levels, numerous studies have made claims about the media’s adverse effects on women’s eating behaviours (e.g., Harrison, 2000). However, our preliminary findings suggest that restrained eaters who struggle with dietary regulation (i.e., those identified with the RS) consume different amounts of sugary snack foods depending on how much attention they direct toward media body ideal images. It appears that women who struggle with dietary control only consume more food than other women consume, when they have concentrated on the images. As discussed, these results have both theoretical and applied implications. We propose that future researchers modify our methodology in the suggested ways and replicate the main findings.

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Contributors
Under the supervision of Dr. Roelie Kuijer, Dr. Jessica Boyce completed this study as part of her PhD thesis. Dr. Boyce conducted the literature search, designed the experiment, analysed the data, and wrote the first draft of the manuscript. Dr. Kuijer reviewed the experimental design, data analyses, and contributed to the revision of the manuscript. Both authors have approved the final manuscript.

Conflict of interest
Both authors declare that they have no conflicts of interest.

References


