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Brief research report

Body dissatisfaction and selective attention to thin-ideal bodies: The moderating role of attentional control

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ABSTRACT

It has been widely hypothesised that elevated body dissatisfaction is characterised by a biased pattern of attentional selectivity that reflects increased attention to stimuli portraying the thin-ideal. Empirical evidence in support of this notion, however, has been inconsistent. The current study aimed to examine the potential moderating role of attentional control in the association between body dissatisfaction and selective attentional responding to thin-ideal bodies. Female undergraduate students (N = 232) completed a self-report measure of body dissatisfaction followed by performance-based measures of attentional control and selective attention. Results provided support for the moderating role of attentional control. Specifically, a positive association between body dissatisfaction and biased selective attention towards thin-ideal bodies was evident only amongst individuals with relatively low levels of attentional control. A general association between body dissatisfaction and selective attention was not observed. These findings may explain previous inconsistent findings and highlight the importance of considering the potential role of attentional control in the expression of body dissatisfaction-linked attentional responding to thin-ideal bodies.

1. Introduction

Body dissatisfaction is a serious public health concern and is highly prevalent among Western populations (Fiske et al., 2014; Mond et al., 2013). This high prevalence is worrying given that body dissatisfaction is known to precede the emergence of eating disorders (Stice et al., 2017; Stice and Van Ryzin, 2019). According to a prominent cognitive model of eating disorders (Williamson et al., 2004), elevated body dissatisfaction contributes to a number of cognitive biases favouring body image information in the environment. In turn, these biases serve to further exacerbate body dissatisfaction. Researchers have been particularly motivated to understand the types of *attentional* biases characterising elevated body dissatisfaction.

One prominent hypothesis is that elevated body dissatisfaction is characterised by a biased pattern of attentional selectivity that reflects increased attention to stimuli portraying a thin-ideal female physique (Rodgers and DuBois, 2016). The most common measures of attentional bias in body image and eating disorders research are implicit measures, such as the attentional probe task (House et al., 2023; Jiang and Vartanian, 2017). While some studies that have employed implicit measures provide support for a relationship between body dissatisfaction and selective attention towards thin-ideal stimuli (Berrisford-Thompson et al., 2021; Dondzilo et al., 2017; Joseph et al., 2016; Moussally et al., 2016), other studies have found no such relationship (Cass et al., 2020; Glauert et al., 2010). It is worth acknowledging a recent meta-analysis, however, suggesting that the most compelling evidence for this relationship is based on studies employing eye movement recording (House et al., 2023). Nonetheless, these overall variable findings could be partially accounted for by individual difference factors that influence the nature of the relationship between body dissatisfaction and selective attention towards thin-ideal bodies.

Attentional control, the ability to volitionally direct the allocation of attention, is one mechanism that may serve to moderate the relationship between body dissatisfaction and selective attention towards thin bodies. According to the process model of emotion regulation (Gross, 1998), attentional control, specifically the ability to adaptatively direct one's attention *away* from a negative emotion-inducing stimulus, serves as an effective emotion regulation strategy. In line with this theory, greater attentional control ability has been shown to interact with other forms of psychopathology in predicting more adaptive patterns of

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attentional selectivity. More specifically, several studies have revealed that the strength of association between anxiety vulnerability and biased attentional responding to anxiety-relevant stimuli varies depending on individuals' ability to control the allocation of their attention, with greater attentional control ability associated with attenuated anxiety-linked biases in selective attention (Booth et al., 2017; Judah et al., 2013; Mazidi et al., 2021). It is therefore plausible to suppose that people with elevated body dissatisfaction may also show differential patterns of attentional responding to thin bodies depending on their level of attentional control.

Considering the above, the aim of the current study was to test the hypothesis that individual differences in attentional control moderate the relationship between body dissatisfaction and selective attention to thin-ideal bodies. Undergraduate females completed a self-report measure of body dissatisfaction followed by performance-based assessment measures of attentional control and selective attentional responding to thin and non-thin bodies. It was predicted that the relationship between body dissatisfaction and selective attention to thin bodies would be disproportionately evident among participants with relatively low attentional control ability.

2. Method

2.1. Participants

Participants were women recruited from a large cohort of undergraduate students from the University of Western Australia who responded to online advertisements on the departmental study recruitment platform. Participants were compensated with course credit. Of those who commenced the study, 231 participants were found to have completed the study procedure and provided valid data,[1] and 210 participants were included in statistical analyses (see Section 3.1). Majority of participants self-identified as Caucasian ($N = 127$), and the remainder of the sample identified as Asian ($N = 55$) or another identity ($N = 28$).

2.2. Materials

2.2.1. Body shape questionnaire

The 8-item Body Shape Questionnaire (BSQ-8 C; (Evans and Dolan, 1993) was used to assess body dissatisfaction. Participants rated their tendency to experience concerns about body shape and feelings of fatness over the past four weeks (e.g., "Have you felt excessively large and rounded?") using a six-point Likert scale (1 = Never, 6 = Always). A measure of body dissatisfaction was computed via the sum of responses on each item, with a higher score reflecting greater levels of body dissatisfaction. The BSQ-8 C has been shown to hold a high degree of internal reliability and validity (Evans and Dolan, 1993; Pook et al., 2008). The internal reliability of the measure in the present study was $\alpha = 0.94$, $CI_{95\%}$ [0.93 – 0.95].

2.2.2. Attentional control assessment task

Attentional control was assessed via the masked target antisaccade paradigm originally described by Roberts, Hager, and Heron (Roberts et al., 1994). The task measures the ability of participants to discriminate the identity of a briefly presented visual target via the execution of rapid controlled attentional movement away from an abrupt visual distractor stimulus. The task has demonstrated convergent validity with other tasks believed to measure attentional control (Miyake et al., 2000; Friedman and Miyake, 2004) and a high level of internal reliability (Basanovic et al., 2022).

The task comprised 90 trials. Each trial commenced with a small fixation cross presented in the centre of the screen for a random duration between 1500 ms and 3500 ms, in 250 ms increments. Next, the fixation cross was removed, and a distractor stimulus was presented. The stimulus was a black square, 20 mm × 20 mm in size, presented 85 mm horizontally to the left or right of the initial fixation cross with equal frequency across trials. After a 225 ms interval, a visual target was presented at the screen position exactly opposite to the cue. The target was a small black arrow, 5 mm in length, pointing left, right, or upward with equal frequency. At 200 ms following its onset, the target was replaced with the symbol '##'. Participants were required to report the direction of the target arrow by pressing the corresponding arrow key on their keyboard. Following an incorrect response, the word "INCORRECT" was presented on screen for 500 ms before the inter-trial interval commenced. Following a correct response the screen was cleared, no feedback was provided, and the next trial began after a 500 ms inter-trial interval. The assessment task was preceded by a block of 20 practice trials that presented the target arrow for a duration that decreased from 1200 ms to 200 ms across trials.

For each participant, the ability to control attention was indexed by the percentage of correct responses across trials, such that a greater percentage of correct responses indicated greater attentional control ability.

2.2.3. Selective attention assessment task

2.2.3.1. Stimulus images. The present study used an image set of women's bodies (Dondzilo, 2019) that have been shown to be capable of revealing biases in selective attention linked to body dissatisfaction (Dondzilo et al., 2017). The stimulus images set contained 40 image pairs. Twenty image pairs included an image of a thin body, and twenty included a non-thin body. The bodies depicted in these images were within the healthy weight range. Thin bodies approximately bordered on underweight, which is consistent with a "thin-ideal", and non-thin bodies approximately bordered on overweight. Images were cropped to focus on specific body regions, such as the abdominal region and thighs as they have been shown to cause high dissatisfaction in women. For each participant, each body image was randomly paired with a non-representational abstract art image that did not contain a body.

2.2.3.2. Assessment task. The selective attention assessment task used an attentional probe paradigm designed to measure the degree to which participants demonstrated a bias towards allocating attention towards images depicting thin bodies, as compared to images depicting non-thin bodies. The task presented 320 trials split across two blocks of 160 trials separated by a participant determined break interval. Each trial commenced with a fixation cross presented in the centre of the screen for 1000 ms. Participants were instructed to attend to the cross when it appeared. Next, the cross was removed and an image pair, comprising one body image and one abstract image, was presented for 500 ms. Images were presented 80 mm wide and 50 mm high on screen. One of the images was centred 110 mm to the left of the central screen location, and the other image was centred 110 mm to the right. After 500 ms the image pair was removed from the screen, and an attention probe, a letter "p" or "q" 5 mm in height, was presented in the location occupied by one of the images. Each probe identity was presented in each location with equal frequency across trials. Participants were instructed to identify the letter, by pressing the appropriate key on their keyboard, as quickly and accurately as possible. Following an incorrect response, the word "INCORRECT" appeared on screen for 5 s, after which the inter-trial interval commenced. Following a correct response, the screen was cleared, no feedback was provided, and the next trial began after a 1000 ms inter-trial interval. The combinations of body image location, probe

[1] Participant data was considered invalid for inclusion and immediately discarded from the study if the participant demonstrated excessively long procedure completion durations (≥ 75 mins), if the participant did not complete the entire study procedure, if the participant completed any part of the procedure more than once, or if the participant stated that their data should not be used for study analysis.

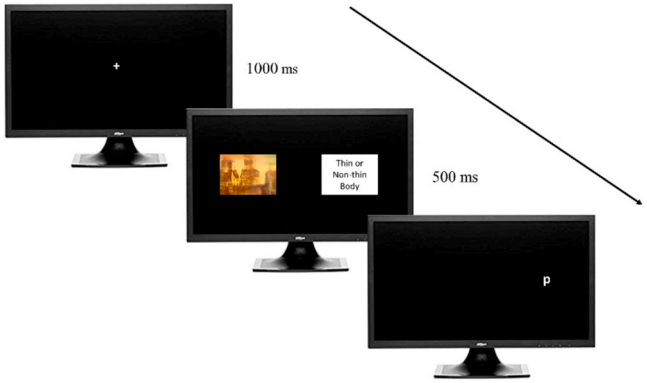

Fig. 1. Illustrative example of a trial in the selective attention assessment task.

location, and probe identity were presented with equal frequency across trials. Participants received trials in a randomised order. Prior to commence the assessment task trials, participants completed eight practice trials that presented each combination of trial conditions. An illustrative example of a trial in the selective attention assessment task is depicted in Fig. 1.

2.2.3.3. Calculation of attentional bias to thin bodies index score. For each participant, an index of biased selective attention favouring the processing of thin bodies as compared to non-thin bodies, labelled the *Attentional Bias to Thin Bodies Index,* was computed using probe discrimination response latencies from the selective attention assessment task. Response latencies that were considered atypical of a participant's responding were excluded prior to computation of the index. This data elimination approach first eliminated latencies of incorrect responses and those below 200 ms or above 2000 ms, as these were considered to reflect invalid responses (e.g., pre-emptive, or distracted responding) and would impact detection of atypical responses. Next, atypically long response latencies were eliminated by removing response latencies that fell more than 2.58 standard deviations above a participant's mean response latency within each trial condition used to generate the assessment index. Remaining response latencies were used to compute the Attentional Bias to Thin Bodies Index, which expressed the degree that participants were speeded to respond to probes proximal to thin bodies as compared to abstract images within thin body stimulus pairings, relative to the degree to which participants were speeded to respond to probes proximal to non-thin bodies as compared to abstract images within non-thin body stimulus pairings. The equation used to compute this index was:

Attentional Bias to Thin Bodies Index = [Thin body image pairs: (Mean response latency for probes proximal to abstract art images) minus (Mean response latency for probes proximal to thin body images)] -[Non-thin body image pairs: (Mean response latency for probes proximal to abstract art images) minus (Mean response latency for probes proximal to non-thin body images)]

Thus, greater positive values on this index represented relatively greater attentional bias towards thin bodies as compared to non-thin bodies, whereas greater negative values represented greater attentional bias towards non-thin bodies as compared to thin bodies.

2.3. Procedure

All assessments were delivered to participants on the Inquisit Web platform accessed via their personal computer. Upon commencing the study participants were presented information on the study procedure and provided informed consent. Participants next completed a screen calibration procedure that ensured all spatial parameters of the tasks were consistent across screen sizes and resolutions, though screen brightness and visual angle were not controlled.[2] Next, participants provided demographic information, height, and weight, and reported whether they had ever been diagnosed with an eating disorder. Participants next completed the Body Shape Questionnaire, the attentional control assessment task, and the selective attention assessment task. Each task was preceded by instructions on its requirements and practice trials. Upon conclusion of the procedure participants received debriefing information.

2.4. Statistical analyses

To examine the degree to which inter-individual variation in attentional control influences the association between selective attention to thin bodies and body dissatisfaction, a two-step moderation regression analysis was conducted. This analysis first computed a regression model that included Attentional Bias to Thin Bodies Index score as the outcome variable, and included age, BMI, Attentional Control Index score, and Body Shape Questionnaire score as predictor variables. Predictor variables were mean centred. The next step added the multiplicative interaction term involving Attentional Control Index scores and Body Shape Questionnaire scores as a predictor variable. The presence of a moderating effect of attentional control was evaluated by examining the statistical significance of the interaction term and R^2 change. To examine the nature of the interaction, a follow-up "simple slopes" and Johnson-Neyman interval analyses were conducted using uncentred predictor variables.

3. Results

3.1. Participant exclusion and descriptive statistics

To increase homogeneity of the participant sample, 14 participants were excluded due to reporting a former or current eating disorder diagnosis.[3] Seven participants were excluded from analysis as they demonstrated a very low proportion of accurate responses on the selective attention assessment task ($\leq$ 53 % accuracy). Remaining participants ($N = 210$) demonstrated a high level of response accuracy on the tasks ($M = 97$ %, $SD = 2$ %, *Range* = 91–100 %). Descriptive statistics regarding participants' demographic, BMI, questionnaire, and attentional task measures are presented in Table 1.

3.2. Influence of attentional control on the association between selective attention and body dissatisfaction

The outcome of each regression model is presented in Table 2. The initial model indicated that neither age, BMI, Body Shape Questionnaire score, nor Attentional Control Index score, significantly predicted Attentional Bias to Thin Bodies Index scores. However, the added interaction term was statistically significant, and the addition of the interaction term resulted in a statistically significant increase in variance explained, indicating that attentional control performance statistically

[2] We recognise that variation in screen parameters can heighten noise of assessment procedures, though balance this with the benefit that online administration allows greater participant sample sizes and onscreen configurations can be expected to be randomly distributed across the sample. We note that a range of attentional effects have been detected under online task administration across a range of paradigms (e.g., Anwyl-Irvine et al., 2021; Basanovic et al., 2023; Basanovic et al., 2022; Mazidi et al., 2021; Semmelmann and Weigelt, 2017), indicating that cognitive studies administered online can be sensitive to individual differences in attentional responding under different task conditions.

[3] The findings resulting from reported analyses were consistent regardless of whether these individuals were included in the sample. Readers who wish to explore these data further may do so by accessing the public data repository associated with this article.

Table 1
Descriptive statistics of measures recorded within the analysed participant sample (N = 210).

Measure	Mean (SD)	Range
Age (years)	20.02 (4.37)	17 – 51
Body Mass Index (kg/m2) – self reported	22.57 (4.37)	15.83 – 38.45
Body Shape Questionnaire	23.72 (10.07)	8 – 48
Attentional Control Index	75.50 (14.36)	24.44 – 100
Attentional Bias to Thin Bodies Index	4.50 (46.29)	-155.77 – 139.48

Note: Trial and item level measures are available at the repository linked to this article.

moderated the strength of the association between Attentional Bias to Thin Bodies Index scores and Body Shape Questionnaire scores. The pattern of data that gave rise to this result is illustrated in Fig. 2. Follow-up 'simple slopes' analyses examined the degree that Body Shape Questionnaire scores predicted Attentional Bias to Thin Bodies Index scores when the Attentional Control Index score was fixed at one standard deviation above (0.90), or below (0.61), the mean of the participant sample. This revealed that greater Body Shape Questionnaire scores predicted greater Attentional Bias to Thin Bodies Index scores when Attentional Control Index score was fixed below the mean, b = 1.31, se = 0.47, $p = .01$, but not when fixed above the mean b = −0.44, se = 0.46, $p = .34$. A Johnson-Neyman interval analysis indicated that Body Shape Questionnaire scores significantly predicted Attentional Bias to Thin Bodies Index scores when the Attentional Control Index score fell below 72 %.

The results of these analyses indicated that greater body dissatisfaction predicted greater biased selective attention towards thin bodies only amongst individuals with relatively lower levels of attentional control ability.

4. Discussion

The current study evaluated the hypothesis that individual differences in attentional control moderates the relationship between body dissatisfaction and selective attention to thin-ideal bodies. It was predicted that there would be greater evidence of a positive association between body dissatisfaction and selective attention to thin-ideal bodies in individuals with relatively low levels of attentional control. Findings revealed that, while there was no direct association between body dissatisfaction and selective attention towards thin-ideal bodies, attentional control moderated this relationship in a manner consistent with the hypothesis under test.

The results of the present study indicate the relationship between body dissatisfaction and selective attention to thin-ideal bodies is disproportionately evident amongst individuals with a reduced ability to control the allocation of attention and is suppressed or eliminated amongst individuals with a heightened ability to control attention. In considering the implications of this novel finding, it is appropriate to consider how poor attentional control might result in a stronger positive relationship between body dissatisfaction and selective attention to thin-ideal bodies. One possibility is that elevated body dissatisfaction serves to increase the degree to which thin-ideal stimuli biases the allocation of attention amongst all females, but sufficient attentional control ability allows strategic attentional processes to suppress the bias when it conflicts with attentional goals. Thus attentional control may allow for effective emotion regulation by reducing maladaptive patterns of attentional selectivity. In turn, an important clinical implication of the current findings is that strategies designed to improve attentional control may serve to reduce maladaptive biases shown by females with elevated body dissatisfaction.

The observed moderation effect provides a potential explanation for the prior inconsistencies in the literature. As noted, some previous studies have found evidence for a positive relationship between body dissatisfaction and selective attention to thin-ideal bodies (e.g., Dondzilo et al., 2017) while others have not (e.g., Cass et al., 2020). Such discrepancy's may be due to variation in attentional control capacity between participant samples. The presently demonstrated maladaptive influence of poor attentional control is also relevant to evidence showing that individuals with attention-deficit/hyperactivity disorder are at high risk of developing an eating disorder (Nazar et al., 2016). Of course, it is important to acknowledge other factors in this relationship. Namely, recent evidence implicates appearance comparisons and eating disorder-specific rumination as important mediating factors (Dondzilo et al., 2021). Future researchers are therefore encouraged to consider more complex models of body dissatisfaction and selective attention towards thin-ideal bodies that encompass both attentional and emotional factors.

It will be important to examine whether the observed influence of attentional control in the present undergraduate female sample is evident in other relevant populations believed to be characterised by biased selective attention, such as men and people with a diagnosis of eating disorders. It is also notable that while we excluded participants with a self-reported history of an eating disorder diagnosis, we did not formally screen participants for current eating disorder diagnosis. Thus, future variations of the current study are recommended to screen for current eating disorder pathology as it is possible that the observed pattern of relationships differ in people who currently experience an eating disorder. Furthermore, given shown relationships between elevated anxiety vulnerability and poorer attention control (Eysenck et al., 2007) and elevated body dissatisfaction (Ivezaj et al., 2010), it will be important for future studies to investigate the role of anxiety vulnerability on the relationship between body dissatisfaction, selective attention, and attentional control.

There are also a couple of methodological considerations worth noting. Namely, in recent years, several researchers have raised concerns about the low reliability of indices of selective attention yielded by the attentional probe task (Price et al., 2015; Rodebaugh et al., 2016). Future replications of the current study would therefore benefit from including a novel dual probe approach to the assessment of selective attention, which has been shown to yield highly reliable indices of selective attention (Grafton et al., 2021). It will also be valuable to further test the veracity of the present findings using alternate attentional control methods. For example, eye-tracking paradigms can reveal the degree to which attentional control can be used by individuals to inhibit

Table 2
Estimates of predictors for each regression model. Predictors are mean centred. Interaction term results in significantly greater variance explained, F(1, 204) = 7.28, p = .008. N = 210. Dependent variable: attentional bias to thin bodies index score.

Predictor	Estimate (b)	CI 95%	p	Estimate (b)	CI 95%	p
(Intercept)	4.50	-1.76 – 10.76	0.16	3.61	-2.59 – 9.81	0.25
Age	0.47	-0.99 – 1.92	0.53	0.70	-0.75 – 2.14	0.34
BMI	1.15	-0.42 – 2.73	0.15	0.82	-0.75 – 2.39	0.31
BSQ Score (BSQ)	0.42	-0.25 – 1.08	0.22	0.43	-0.22 – 1.09	0.19
Attentional Control Index (ACI)	-0.07	-0.52 – 0.38	0.75	0.02	-0.43 – 0.47	0.94
Interaction term (BSQ*ACI)				-0.06	-0.11 – − 0.02	0.008 *
R^2 / R^2 adjusted	0.032 / 0.013			0.065 / 0.042		

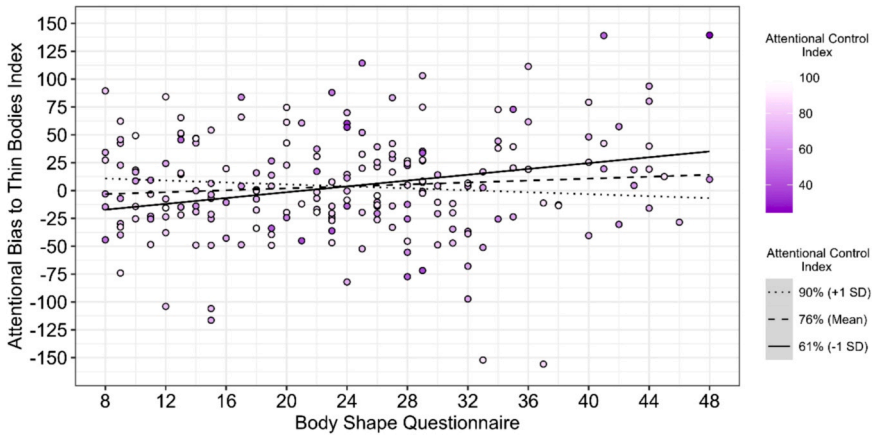

Fig. 2. Illustration of attentional control moderation effect. Lines illustrate predicted values of attentional bias index scores across the range of BSQ scores, at discrete levels of attentional control index scores. Points represent participants. Shading of points represents attentional control index score for each participant.

pre-potent responding to valenced stimuli (e.g., Reinholdt-Dunne et al., 2012). The findings revealed by such approaches would determine the robustness of the currently obtained findings.

For the moment, the present study has provided evidence to suggest that the strength of the relationship between body dissatisfaction and selective attention towards thin-ideal bodies may be moderated by variation in people's attentional control ability. Specifically, findings obtained in the current study indicated that a positive association between body dissatisfaction and selective attention towards thin-ideal bodies is evident only amongst individuals with relatively low levels of attentional control. These findings may explain previous inconsistent findings and highlight the importance of considering the potential role of attentional control in the expression of body dissatisfaction-linked biases in attentional responding to thin-ideal bodies.

CRediT authorship contribution statement

Laura Dondzilo: Visualization, Project administration, Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Writing - original draft, Writing - review & editing. **Julian Basanovic:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Materials, data, and analyses reported in the manuscript are available at: https://osf.io/b4vxp/.

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