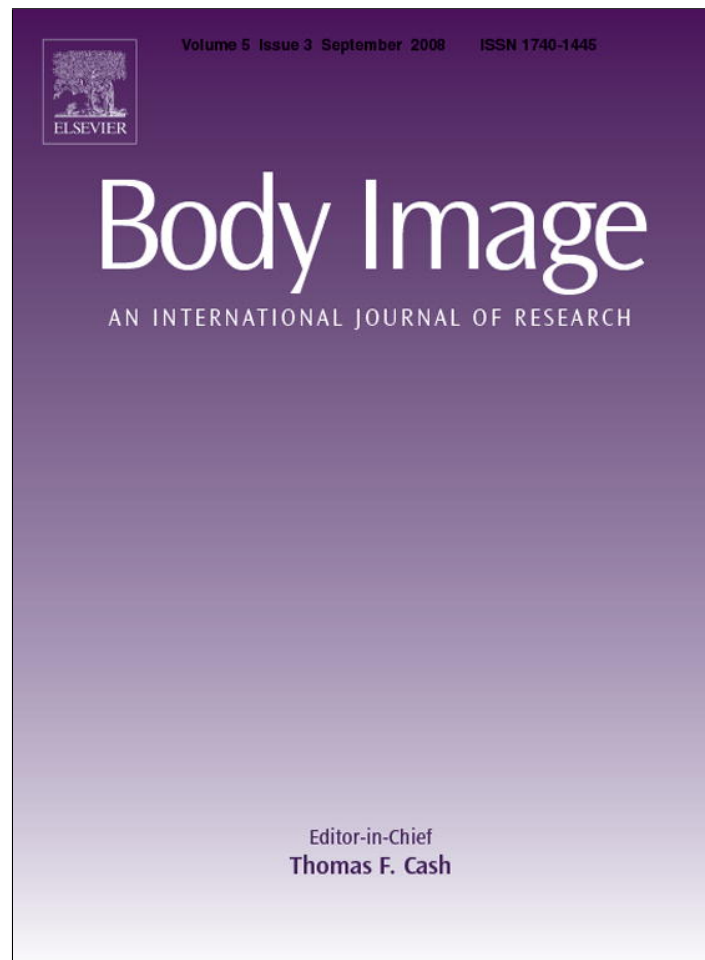


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Cognitive processing of body and appearance words as a function of thin-ideal internalization and schematic activation

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ABSTRACT

To better understand how women at risk of body image disturbance respond when their body concerns are activated, we examined attentional and memory biases in undergraduate women with high thin-ideal internalization, an identified risk factor for eating disorders, following priming of body and appearance concerns. Female undergraduates ($N = 186$) viewed photos of either sports cars or attractive swimsuit models, then completed the Lexical Decision Test, a word recall test, and questionnaires assessing thin-ideal internalization and eating disorder symptomatology. High thin-ideal internalizers did not exhibit cognitive biases predicted by cognitive models of eating disorders, even when their body and appearance concerns were primed by exposure to attractive models. Converging evidence suggests that high-risk non-clinical samples rarely exhibit cognitive biases characteristic of individuals with eating disorders, and, in fact, may actually incorporate ideal appearance into their schemas and preferentially attend to attractive stimuli.

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Introduction

Cognitive behavioural approaches for the treatment of body image disturbances including eating disorders help individuals to identify and modify maladaptive behaviours and cognitions (Cash & Strachan, 2002). According to Vitousek and Hollon's (1990) cognitive theory of eating disorders, individuals with eating disorders develop organized cognitive structures (self-schemas) around weight and its implications for the self. According to this theory, individuals with eating disorders selectively process and have enhanced recall for schema-congruent information (e.g., fat stimuli) and resist schema-incongruent information (e.g., thin stimuli)—this pattern of cognitive processing has been theorized to result in the persistence of eating disorder symptomatology. For

example, these individuals may attend to body parts they are most dissatisfied with and ignore body parts they are relatively more satisfied with. An understanding of cognitive processes in individuals at risk of body image disturbance, such as how they respond when their body concerns are activated, can provide guidance as to where to intervene in treatment.

Attentional bias is one form of cognitive bias that has received much attention in both patient and non-patient samples. The assumption underlying attentional biases is that people who are preoccupied with their body weight, body shape, or food will selectively attend to such stimuli (Williamson, White, York-Crowe, & Stewart, 2004). A meta-analysis of attentional biases in eating disorders found evidence for an attentional bias towards body-related words in anorexia nervosa, and towards body and food-related words in bulimia nervosa (Dobson & Dozois, 2004). There was little consistent evidence for an attentional bias in high-risk non-clinical samples (e.g., those with high drive for thinness, weight preoccupation, body dissatisfaction, or dietary restraint) (Dobson & Dozois, 2004; Lee & Shafran, 2004).

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With few exceptions (Sackville, Schotte, Touyz, Grifiths, & Beumont, 1998), previous studies have focused exclusively on attention to negatively valenced information (e.g., “fat” words) and neglected positively valenced information (e.g., “thin” words), so it is uncertain whether individuals with eating disorders or eating disorder risk factors selectively process schema-congruent information and resist schema-incongruent information as Vitousek and Hollon's (1990) theory predicts, or attend to all body-related information regardless of valence. In addition, no studies have assessed the processing of information related to overall physical appearance (i.e., words pertaining to attractiveness and unattractiveness) so it is uncertain whether individuals with eating disorders or eating disorder risk factors preferentially process body information in particular, or appearance information more generally.

Memory bias has also been examined in eating disorder research, albeit to a lesser extent than attentional bias. The assumption underlying memory biases is that individuals who are preoccupied with body weight or shape allocate additional resources to the processing of body-related information, allowing for greater elaboration of stimuli during encoding and enhanced recall of body-related information (King, Polivy, & Herman, 1991; Sebastian, Williamson, & Blouin, 1996).

Individuals with anorexia nervosa have demonstrated a memory bias for body and food-related words (Hermans, Pieters, & Eelen, 1998), whereas those with bulimia nervosa have demonstrated a memory bias for body-related words (Hunt & Cooper, 2001; Sebastian et al., 1996), but not food-related words (Hunt & Cooper, 2001). It is noteworthy that this pattern of results is opposite to that reported in the attentional bias literature (Dobson & Dozois, 2004), suggesting that perhaps individuals with anorexia nervosa feel anxious about their bodies and are preoccupied with their bodies and food, whereas individuals with bulimia nervosa are preoccupied with their bodies and feel anxious about their bodies and food.

Examining memory biases in non-clinical populations with eating disorder risk factors have generated mixed results. Preliminary findings suggest that restrained eaters have better recall (King et al., 1991) and recognition (Boon, Vogelzang, & Jansen, 2000) of body-related words than unrestrained eaters, and that women who base their self-worth on weight and shape have greater false recognition of weight and shape words in a false alarm effect paradigm relative to women who base little of their self-worth on weight and shape (Geller, Johnson, & Madsen, 1997). In contrast, a study comparing weight preoccupied individuals to controls found no differences between groups in the recall of body-related words (Sebastian et al., 1996). A study comparing individuals with low and high body dysphoria found that those with high body dysphoria recalled significantly more fat words and fewer thin words than those with low body dysphoria; however, this finding was not replicated using a word recognition task (Baker, Williamson, & Sylve, 1995). Given the scarcity of studies examining memory biases in individuals with eating disorder risk factors, these findings await replication.

One possible explanation to account for the weak or lack of cognitive biases in high-risk non-clinical samples is that individuals' body concerns have not been activated prior to engaging in the cognitive task. Lending support to this theory is a study which found that non-depressed controls performed in a similar manner to depressed patients on an attentional test, but only when a priming procedure was used to make their cognitive state more similar to depressed patients (Segal & Vella, 1990). Similarly, another study found that appearance-schematic women demonstrated attentional biases to a heterogeneous list of appearance words (e.g., lipstick, ugly, bikinis), but only when their appearance schemas were activated (Labarge, Cash, & Brown, 1998). According to Beck's cognitive theory (Beck, Rush, Shaw, & Emery, 1979), contextual events serve to activate or “prime” otherwise latent schemas, resulting in preferential processing of schema-congruent information. If schematic activation is required for the detection of cognitive biases, then the results of previous studies examining cognitive biases in high-risk non-clinical samples are inconclusive because the lack of significant findings may be attributed to lack of schematic activation. The current study explored this possibility by attempting to activate schemas to increase the likelihood that any cognitive biases would be detected.

Exposure to attractive models may serve as a schema-congruent trigger which activates body and appearance-related concerns (Altabe & Thompson, 1996), particularly for women with high thin-ideal internalization. Thin-ideal internalization, an identified risk factor for eating disorders, refers to the extent to which an individual accepts socially defined ideals of attractiveness, such as those portrayed by professional models in the visual media (Thompson & Stice, 2001). Social comparison may be the mechanism by which exposure to attractive models adversely affects body satisfaction (Hargreaves & Tiggemann, 2004; Tiggemann & McGill, 2004). Studies examining the effect of the media on body image found that women who were explicitly instructed to rate the attractiveness of models or to compare themselves to attractive models experienced greater body dissatisfaction (Cattarin, Thompson, Thomas, & Williams, 2000; Hargreaves & Tiggemann, 2004; Tiggemann & McGill, 2004) and negative schematic activation (Altabe & Thompson, 1996). Even a brief exposure to attractive models from the media results in a negative body image state, but only among women with high thin-ideal internalization and social comparison tendencies (Yamamiya, Cash, Melnyk, Posavac, & Posavac, 2005), suggesting that exposure to attractive models may be a schema-congruent trigger for women with high thin-ideal internalization.

The present study attempted to provide a more rigorous test of cognitive processing in a high-risk non-clinical sample by activating body and appearance-related concerns prior to assessing cognitive processing. Undergraduate women were divided into two groups based on their level of thin-ideal internalization (low vs. high). Next, they completed a photo-rating (priming) task, in which they were alternately assigned to view photos of either sports cars (control condition) or attractive swimsuit models (model exposure condition). Following the priming

manipulation, participants completed the Lexical Decision Test and a word recall test to assess attentional and memory biases for negatively and positively valenced body (e.g., fat, thin) and appearance-related words (e.g., unattractive, attractive). Viewing attractive swimsuit models would be expected to activate body and appearance schemas among women with high thin-ideal internalization, and thus, bias their cognitive processing of body and appearance words.

We hypothesized that women with high thin-ideal internalization who were primed with photos of swimsuit models would be the only group to demonstrate attentional and memory biases. Specifically, we hypothesized that: (1) Women with high thin-ideal internalization who were primed with photos of swimsuit models would respond faster to and have better recall of fat and unattractive words relative to neutral words, and respond slower to and have poorer recall of thin and attractive words relative to neutral words; (2) Women with high thin-ideal internalization who were not primed with photos of swimsuit models and women with low thin-ideal internalization would not demonstrate attentional or memory biases for body or appearance words relative to neutral words. In addition to demonstrating a cognitive bias relative to neutral words, cognitive theories also predict that women with high thin-ideal internalization who are primed with photos of attractive models would attend to and have better recall of fat words than thin words, and of unattractive words than attractive words. Therefore, we hypothesized that there would be an interaction between internalization, priming condition, and word valence such that: (3) Women with high thin-ideal internalization who were primed with photos of swimsuit models would attend to and have better recall of fat than thin words and of unattractive than attractive words; (4) Women with high thin-ideal internalization who were not primed with photos of swimsuit models and women with low thin-ideal internalization would demonstrate similar attention to and memory for fat and thin words and for unattractive and attractive words.

Method

Participants

Female students ($N = 186$) in undergraduate psychology courses at the University of Calgary voluntarily participated in this study and received course credit for their participation. Participants spoke English as their first language. The sample consisted of Caucasian (57.9%), Asian (30.1%), East Indian (7.5%), and mixed ethnicity (4.5%) women. Participants had a mean age of 20.0 years ($SD = 1.7$) and 2.8 years ($SD = 1.3$) of post-secondary education. The mean body mass index (BMI) of participants was 21.7 kg/m^2 ($SD = 3.4$), which falls within the normal range (Weinsier & Kushner, 2002).

Materials and measures

Body mass index (BMI = kg/m^2)

The BMI correlates highly with more complex methods of measuring body mass such as skinfold thickness and body

density measurements (Garrow & Webster, 1985). Self-reported height and weight were used to calculate BMI.

Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; Heinberg, Thompson, & Stormer, 1995)

The SATAQ is a 14-item Likert-scaled self-report instrument that measures awareness of societal attitudes about thinness/attractiveness and internalization/acceptance of these societal beliefs. The 8-item internalization subscale was used in the present study to divide the sample into low and high thin-ideal internalization groups. It converges with several existing measures of body image disturbance and eating dysfunction (Heinberg et al., 1995). Internal consistency reliability for the Internalization subscale was 0.85 in the present study.

Eating Disorders Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994)

The EDE-Q is a 38-item questionnaire derived from the Eating Disorders Examination, which assesses the specific psychopathology of eating disorders. Internal consistency reliability for the total score was 0.94 in the present study.

Lexical Decision Test (LDT; Meyer & Schvaneveldt, 1971)

The LDT is an attentional test that investigates strength of associations between word concepts as a way to assess the salient aspects of an individual's cognitive organization. A computerized LDT was used in the present study to assess attentional biases using DMDX software (Forster, 1999). The LDT began with the presentation of a word or non-word letter string on the center of a computer monitor. Participants were asked to indicate whether the stimulus was a word or non-word as quickly and accurately as possible by pressing the corresponding computer key. The task assumes that an underlying cognitive structure (e.g., body schema) facilitates the recognition of stimulus target words (e.g., faster decision for fat words than for neutral words), whereas cognitive avoidance slows recognition of stimulus target words. Letter strings were presented in random order with an inter-stimulus interval of 1000 ms. The DMDX program uses a high performance timer, enabling timing to be accurate to the millisecond (Forster & Forster, 2003).

Five word lists were used in the LDT (Cassin & von Ranson, 2005): (1) 18 fat words (e.g., "chubby"); (2) 18 thin words (e.g., "slender"); (3) 16 unattractive words (e.g., "ugly"); (4) 16 attractive words (e.g., "pretty"); and (5) 68 neutral words (e.g., "moist"). The neutral word list was composed of adjectives that are not typically used to describe people. The neutral, fat, and thin word lists were matched on number of syllables, word length, word familiarity, and normative word frequency, as were the neutral, unattractive, and attractive word lists. The 136 non-words were matched with words on word length and number of syllables.

Word recall task

Following the LDT and a brief distraction task, participants were presented with a blank sheet of paper and were asked to recall as many words as possible from the LDT.

Procedures

All participants were tested individually. The experiment was described as a “Consumer Preference Study” investigating the effect of self-image on decision-making and preferences for consumer products to avoid potentially biasing responses by alerting participants to the study’s true purpose. Participants began by completing informed consent and a demographics questionnaire. Participants then completed a photo-rating (priming) task, in which they were alternately assigned to either the control or model exposure condition. Similar to a previous study (Posavac, Posavac, & Posavac, 1998), individuals in the control condition viewed photos of visually appealing sports cars found in car dealership websites, none of which presented humans. Individuals in the model exposure condition viewed full-length photos of thin, attractive, one-piece swimsuit models found in swimsuit websites (e.g., Victoria’s Secret).² The DMDX program (Forster, 1999) was used to display color photos of sports cars or attractive swimsuit models on an 18-in. computer monitor for the priming procedure. Each of the 15 photos was presented automatically for 10 s to ensure that each participant received the same duration of exposure.

Participants in the present study completed three questions following each of the 15 photos: (1) “How much do you like this swimsuit (or car) on a scale from 1 (really dislike) to 10 (really like)?” This question aimed to support the cover story of a consumer preferences study. (2) “How likely is it that you would wear a similar swimsuit (or drive a similar car) on a scale from 1 (very unlikely) to 10 (very likely)?” This question aimed to shift the focus of model exposure participants from the swimsuits to their own bodies. (3) “How does your body compare with the swimsuit model’s (or your car compare to the sports car) on a scale from 1 (much less attractive) to 10 (much more attractive)?”³ This question aimed to explicitly encourage comparison to the models and activate body self-schemas in order to maximize the potency of the priming condition among those in the model exposure condition. Participants were informed that they would be given 20 s to respond to the three questions before the next photo was presented.

Upon completion of the photo-rating (priming) task, participants completed the LDT, as described above. Following the LDT, participants were asked to write as many numbers as possible in chronological order as part of a timed test. This two-minute distraction task was intended to attenuate possible recency effects. Afterwards, participants were asked to recall as many words as possible from the LDT. Upon completion of the word recall task, participants completed the SATAQ (Heinberg et al., 1995) and EDE-Q (Fairburn & Beglin, 1994). The

questionnaires were administered following the LDT because we theorized that all participants (even those in the control condition) would have been primed to be more aware of body and appearance words had they been administered before the LDT, potentially minimizing or eliminating any differences between groups on the attention and memory tasks. Prior to debriefing, participants were asked their opinions about the purpose of the study to assess whether the cover story was convincing. No participants expressed suspicion regarding the photo-rating (priming) task.

Statistical analysis

Thin-ideal internalization, as measured by the Internalization scale of the SATAQ, is a between-participants categorical independent variable with two groups. Individuals who scored in the upper tertile on the SATAQ Internalization subscale comprised the high internalization group ($n = 68$), whereas those who scored in the lower tertile formed the low internalization group ($n = 66$). Data from individuals who scored in the middle tertile on the SATAQ-Internalization scale were excluded from all subsequent analyses in order to maximize differences between the low and high internalization groups. An a priori power analysis indicated that the remaining sample of 134 participants was adequate to detect a small to medium effect size, with alpha set at 0.05 and power of 0.8. Thin-ideal internalization was treated as a categorical variable in order to facilitate comparison with the majority of existing studies which have grouped participants using a median or tertile split. Priming condition is a between-participants categorical independent variable with two groups: control (photos of sports cars) and model exposure (photos of swimsuit models).

Attentional bias, as measured by the mean interference score for each word list, is a continuous dependent variable. Four interference scores were calculated for each subject by subtracting the mean neutral word list response latency from the mean experimental word list (i.e., fat, thin, unattractive, attractive) response latency. Thus, negative interference scores indicate that participants were faster to respond to experimental words than to neutral words and positive interference scores indicate that participants were slower to respond to experimental words than to neutral words. Memory bias, as measured by the percentage of words recalled from each word list, is also a continuous dependent variable.

Lexical decisions were categorized as correct responses, incorrect responses, or outliers. Outliers were operationalized as response latencies less than 400 ms or greater than 1500 ms, based on cut-off values employed by Rieger et al. (1998). Incorrect responses (error rate = 7.2%) and outliers (outlier rate = 2.3%) were excluded from mean response latency and interference score calculations.

Paired samples *t*-tests were conducted to examine the first and second hypotheses that women with high-thin ideal internalization would demonstrate attentional and memory biases for body and appearance words relative to neutral words, whereas women in the other three groups would not demonstrate attentional or memory biases for

² The swimsuit models selected for the present study were those rated as the 15 most attractive by 50 undergraduate females in a pilot study. They were asked to rate the attractiveness of 30 swimsuit models on a 10-point scale, taking both facial appearance and physique into consideration. Pilot study participants’ mean attractiveness ratings of the 15 swimsuit models ranged from 7.5 ($SD = 1.5$) to 8.9 ($SD = 1.0$).

³ If participants did not own a car, they were asked to compare it to the vehicle they most often drive or ride in (e.g., parent, partner).

Table 1
Mean thin-ideal internalization and eating pathology scores as a function of internalization and priming condition

Questionnaire	Low internalization				High internalization				
	Control (n = 34)		Model exposure (n = 32)		Control (n = 34)		Model exposure (n = 34)		
	M	SD	M	SD	M	SD	M	SD	
SATAQ									
Internalization	16.6	3.4	20.2	4.1	30.2	3.3	32.7	3.7	
EDE-Q									
Dietary restraint	0.7	0.8	1.0	1.2	1.6	1.0	2.0	1.4	
Eating concerns	0.4	0.5	0.4	0.6	1.1	1.1	1.5	1.2	
Shape concerns	1.4	1.2	1.7	0.9	3.0	1.2	3.3	1.4	
Weight concerns	1.1	1.1	1.4	1.1	2.5	1.3	2.7	1.4	
Total score	1.0	0.8	1.2	0.8	2.2	1.0	2.5	1.2	

Note. SATAQ: Sociocultural Attitudes Towards Appearance Questionnaire, EDE-Q: Eating Disorder Examination-Questionnaire. High internalizers scored higher than low internalizers on all EDE-Q subscales, $p < 0.001$.

body or appearance words relative to neutral words. 2(internalization: low vs. high) × 2(priming: control vs. model exposure) × 2(word valence: negative vs. positive) split-plot ANOVAs were conducted to examine the three-way interaction, separately for fat and thin words and for unattractive and attractive words. These analyses were conducted to examine the third and fourth hypotheses that women with high thin-ideal internalization who were primed with photos of swimsuit models would attend to and have better recall of fat than thin words and of unattractive than attractive words, whereas women in the other three groups would demonstrate similar attention to and memory for fat and thin words and for unattractive and attractive words. Cognitive biases for body words were not directly compared to cognitive biases for appearance words in the current study because body and appearance word lists were not matched on word length or normative word frequency, both of which can influence cognitive processing. In order to protect from Type 2 error and control for the number of comparisons made, a conservative alpha of 0.01 was used in interpreting significance.

Results

Participant characteristics

No significant differences were found between any of the four groups (low/high internalization × control/model

exposure group) for age [$F(130) = 2.32, p = 0.13$], years of education [$F(130) = 2.38, p = 0.13$], or BMI [$F(130) = 0.17, p = 0.73$]. As expected given the tertile split, high internalizers scored significantly higher than low internalizers on the SATAQ Internalization subscale, $F(1, 130) = 495.6, p < 0.001$, as well as on the measure of eating disorder pathology (EDE-Q total score), $F(1, 130) = 55.01, p < 0.001$ (Table 1). The EDE-Q subscale scores of the high internalizers exceeded the 75th percentile according to normative data for young adult women (Mond, Hay, Rodgers, & Owen, 2006), suggesting that high internalizers constituted a high-risk group for eating pathology.

Attentional biases

Interference scores for fat and thin words are presented in Table 2. No groups exhibited an attentional bias for fat or thin words relative to neutral words, as demonstrated by non-significant interference scores. The three-way interaction among internalization, priming condition, and word valence was not significant, $F(1, 130) = 0.02, p = 0.97$. That is, interference scores did not differ across internalization groups (low vs. high), priming conditions (control vs. model exposure), or word valence (fat vs. thin).

Interference scores for unattractive and attractive words are also presented in Table 2. All four groups responded significantly slower to unattractive words

Table 2
Interference scores (in milliseconds) for body and appearance-related words (vs. neutral words) as a function of thin-ideal internalization and priming condition

Word type	Low internalization						High internalization					
	Control (n = 34)			Model exposure (n = 32)			Control (n = 34)			Model exposure (n = 34)		
	M	SD	t	M	SD	t	M	SD	t	M	SD	t
Body-related												
Fat	-4.3	43.1	0.58	11.4	58.4	1.10	3.0	36.6	0.47	-3.9	39.9	0.57
Thin	6.0	43.6	0.80	4.0	29.1	0.77	3.4	48.7	0.43	0.7	40.7	0.10
Appearance-related												
Unattractive	43.8	47.5	5.37**	42.3	42.2	5.66**	38.2	46.1	4.83**	48.1	46.1	6.08**
Attractive	-6.9	43.1	0.93	-20.5	36.7	3.17*	-29.8	40.3	4.30**	-47.4	29.5	9.36**

Note. Positive interference scores indicate participants respond slower to body/appearance words than to neutral words, negative interference scores indicate participants respond faster to body/appearance words than to neutral words. All t-tests refer to comparison with neutral words.

* $p < 0.01$.
** $p < 0.001$.

Table 3

Recall of body and appearance-related words (vs. neutral words) as a function of thin-ideal internalization and priming condition

Word type	Low internalization						High internalization					
	Control (n = 34)			Model exposure (n = 32)			Control (n = 34)			Model exposure (n = 34)		
	(%)	SD	t	(%)	SD	t	(%)	SD	t	(%)	SD	t
Neutral	4.6	3.2		4.1	2.7		3.5	2.3		3.6	3.2	
Body-related												
Fat	15.0	9.2	6.69**	15.3	6.3	10.28**	16.2	5.9	11.31**	15.0	9.0	7.17**
Thin	11.9	8.0	5.54**	15.9	7.9	9.82**	16.9	11.1	6.92**	14.6	9.3	6.53**
Appearance-related												
Unattractive	5.7	5.7	1.00	5.8	5.4	1.56	6.3	4.8	3.31*	7.4	5.5	3.67*
Attractive	15.3	7.6	8.24**	11.6	6.8	5.77**	14.0	8.0	7.49**	14.6	7.1	9.14**

Note. (%) = Percentage of words recalled from each word list. All *t*-tests refer to comparison with neutral words.

* $p < 0.01$.

** $p < 0.001$.

relative to neutral words. The three-way interaction between internalization, priming condition, and word valence was not significant, $F(1, 130) = 0.68$, $p = 0.41$. However, the two-way interaction between internalization and word valence was significant, $F(1, 130) = 7.21$, $p = 0.008$. Follow-up independent samples *t*-tests indicated that the high internalization group responded significantly faster to attractive words than did the low internalization group, $t(132) = 3.79$, $p < 0.001$.

Memory biases

Percentages of words recalled from each word list are presented in Table 3. Overall, relatively few fat and thin words (<17%) were recalled by all four groups. All four groups demonstrated a memory bias for fat and thin words (i.e., recalled significantly more fat and thin words than neutral words). The three-way interaction among internalization, priming condition, and word valence was not significant, $F(1, 130) = 2.29$, $p = 0.13$. That is, word recall did not differ across internalization groups (low vs. high), priming conditions (control vs. model exposure), or word valence (fat vs. thin).

Overall, relatively few unattractive and attractive words (<16%) were recalled by all four groups. The high internalization group demonstrated a memory bias for unattractive words (i.e., recalled significantly more unattractive words than neutral words) regardless of whether they were exposed to swimsuit models. All four groups demonstrated a memory bias for attractive words (i.e., recalled significantly more attractive words than neutral words). The three-way interaction between internalization, priming condition, and word valence was not significant, $F(1, 130) = 1.41$, $p = 0.23$. However, there was a significant main effect of word valence, $F(1, 130) = 115.4$, $p < 0.001$, such that all groups recalled significantly more attractive than unattractive words.

Discussion

The present experiment tested whether undergraduate women with high thin-ideal internalization, a substantiated risk factor for eating disorders (Thompson & Stice, 2001), would exhibit the cognitive biases predicted by the

cognitive model of eating disorders (Vitousek & Hollon, 1990) following priming of their body and appearance concerns. The findings suggest that women with high internalization do *not* preferentially attend to and recall schema congruent information or avoid and have poor recall of schema incongruent information, even when their body and appearance concerns are activated.

The lack of attentional bias for fat and thin words in the present study lends additional support to the body of evidence suggesting that cognitive biases are more characteristic of women with clinical eating disorders than women in the general population (e.g., Dobson & Dozois, 2004; Lee & Shafran, 2004). A longitudinal study, in which individuals with disordered eating are followed over time, would be required to examine whether cognitive biases emerge prior to the onset of a diagnosable eating disorder or following the onset of an eating disorder as an individual becomes more anxious about and preoccupied with body and food.

High thin-ideal internalizers in the current study selectively attended to attractive words. This raises the possibility that high internalizers incorporate ideal appearance into their self-schemas. That is, they attend to attractive words because these words exemplify the ideal state to be achieved, not because they are schema-congruent. Conversely, exposure to attractive models may actually have an inspirational or self-enhancement effect on women who value the importance of appearance and strive to bring their appearance closer to the ideal (Mills, Polivy, Herman, & Tiggemann, 2002).

All groups exhibited a memory bias for body and appearance-related words, except low internalizers, who did not preferentially recall unattractive words. The groups' similarities in word recall may be attributed to a number of factors. Differences between groups may have been reduced by memory decay during the two-minute filler task. Because people typically retrieve more information via recognition than free recall, it could be useful to replicate this study by examining whether a recognition task facilitates retrieval of schematics' previously encoded body and appearance-related words, yielding differences between groups. The lack of group differences may also be attributed to the operation of weight-related schemata, as opposed to weight-related *self*-schemata (Vitousek &

Hollon, 1990). According to Vitousek and Hollon (1990), weight-related schemas refer to cognitive structures that code information about what it means to be fat or thin, as opposed to schemas about the *self* as fat or thin. Due to the weight stereotypes perpetuated in Western culture, individuals may be equally disposed to associate being slim with enviable qualities (e.g., intelligent, motivated) and being overweight with undesirable qualities (e.g., slow, lazy) (Greenleaf, Starks, Gomez, Chambliss, & Martin, 2004). Indeed, regardless of BMI, restrained and unrestrained eaters have equally strong negative implicit attitudes towards fatness and positive implicit attitudes towards thinness (Vartanian, Herman, & Polivy, 2005). Although the meaning of weight and appearance may be less complex and emotionally charged for women with low internalization, even the most general idea about one's body or appearance may be sufficient to elicit memory biases for body and appearance-related stimuli (Markus, Hamill, & Sentis, 1987).

The results replicate those of a previous study which differed only in the potency of the priming condition (Cassin, 2003). Specifically, the previous study did not explicitly encourage social comparison during the photo-rating (priming) task. Undergraduate women ($N = 199$) were asked only to rate how much they liked each swimsuit, but not to rate how likely it is that they would wear each swimsuit or how their bodies compared with the swimsuit models. Thus, the priming task may not have been potent enough to activate body and appearance schemas. The methodology of the previous study was identical in all other respects. Despite the minor variations in methodology, the results of these studies were virtually identical.

Although the priming condition in the current study was similar to those used in previous studies to effectively increase body dissatisfaction (Tiggemann & McGill, 2004) and negative schematic activation (Altabe & Thompson, 1996), the similarities between model exposure and control groups on the LDT and recall test suggest that the model exposure priming still may not have been sufficiently potent or personally relevant to activate schemas. It could be argued that media images are so pervasive that the models presented briefly in the present study had no significant impact on those who viewed them or that the effects of priming were transient. It could also be argued that participants did not perceive the professional swimsuit models as a fair comparison standard (Cash, Cash, & Butters, 1983). It is also possible that participants did compare themselves to the swimsuit models, but that some participants had self-improvement motives for social comparison rather than self-evaluation motives. Self-improvement motives reduce the negative effect of social comparison on body-focused anxiety (Halliwell & Dittmar, 2005), which may partly account for the lack of attentional bias.

Although this study had several methodological strengths, such as the use of a more rigorous cognitive test and well-matched word lists including both negatively and positively valenced words pertaining to body and appearance, a discussion of its limitations is warranted.

First, current cognitive paradigms that assess attentional biases in response to disorder salient words have been criticized as lacking in clinical relevance (Lee & Shafran, 2004). Perhaps attentional biases have rarely been found in non-clinical samples because the mere observation of body and appearance-related words is not inherently threatening. Non-clinical samples with high internalization and/or high levels of eating disorder symptomatology may selectively attend to fat and unattractive real life images, such as images of obese individuals or a scale indicating a heavy weight. Second, because thin-ideal internalization was assessed at the end of the study, responses may have been influenced by the priming task (model exposure). Conducting the study over two sessions (i.e., assess internalization in Session 1 and conduct priming task and assess cognitive biases in Session 2) would have reduced this risk. However, it is unlikely that administering the SATAQ in a different session would have had a significant impact on the overall pattern of findings because many of the study's findings were either far from approaching statistical significance or were actually contrary to those hypothesized by cognitive theories of eating disorders (Vitousek & Hollon, 1990). Third, the LDT may not be sensitive enough to measure attentional biases in non-clinical populations; however, this criticism is not specific to the LDT and may also be levied at other tests of attentional bias, including the modified Stroop test (Dobson & Dozois, 2004).

These results, together with previous meta-analytic findings (Dobson & Dozois, 2004), suggest that either non-clinical samples rarely exhibit cognitive biases or the cognitive paradigms commonly used to assess attentional biases are not sensitive enough to detect differences in non-clinical samples. The theory positing that individuals with eating disorders preferentially process schema-congruent information and avoid schema-incongruent information (Vitousek & Hollon, 1990) has received little support in high-risk non-clinical samples. In fact, the results of the present study suggest that high internalizers may actually incorporate ideal appearance into their self-schemas and preferentially attend to attractive stimuli. A replication of the current study using a clinical sample could determine whether individuals with eating disorders perform consistent with Vitousek and Hollon's (1990) cognitive theory, and whether they are self-schematic for weight specifically or appearance more generally which could have implications for the focus of treatment.

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