



## Automatic evaluation of body-related images

Kaaren Watts<sup>\*</sup>, Jacquelyn Cranney, Melanie Gleitzman

University of New South Wales, Sydney, NSW, Australia

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### ABSTRACT

An affective priming task was used to determine whether females automatically evaluate body-related images, and to establish whether this is moderated by appearance schematicity, thin internalisation, body dissatisfaction, and dietary restraint. In a within participants design, the valence congruence of the prime and target pairs was manipulated, as was the interval between them. Undergraduate females ( $N = 87$ , Experiment 1 and  $N = 72$ , Experiment 2) individually selected colour images as the primes. Each prime was presented briefly, followed by a target word which the participant judged as “good” or “bad”. The dependent variable was response latency to the target word. Automatic evaluation was evident; responding to congruent pairs was faster than responding to incongruent pairs. The individual difference variables were not related to automaticity. The findings suggest that brief encounters with body-related images are likely to produce automatic affective responses in young women irrespective of body-related concerns.

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### Introduction

Sociocultural models have linked the development of body image disturbance and eating disorders to exposure to media images of the thin female ideal (Stice, 1994; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). The ideal female body is depicted as thin and young, with long legs and well-developed breasts (Levine & Smolak, 1998). This ideal is promoted as highly desirable and attainable, despite the media’s heavy editing of images (Brownell, 1991; Richins, 1991). Exposure to images depicting the slender female ideal, relative to exposure to average-sized or neutral images, has small yet consistent negative effects on some females’ levels of body dissatisfaction; specifically, females with existing body image concerns are most likely to experience adverse effects (Groesz, Levine, & Murnen, 2002; Heinberg & Thompson, 1995).

Research attention has increasingly turned to the processes underlying the impact of media exposure (e.g., Tiggemann & McGill, 2004; van den Berg & Thompson, 2007), and traditionally cognitive theories distinguish between automatic and controlled modes of information processing (e.g., Shiffrin & Schneider, 1977). An automatic process is fast, effortless, and does not require attentional resources or conscious control. A controlled process is slow, effortful, and requires conscious regulation (Shiffrin & Schneider, 1977; Williams, Watts, MacLeod, & Mathews, 1997). Evaluation is one of the most dominant and pervasive of human responses (Jarvis & Petty, 1996), and tends to be fast, immediate, and automatic (Ajzen, 2001). Evaluative responses influence both the way we perceive and interpret stimuli in our environment (Ferguson, Bargh, & Nayak, 2005) and our behaviour (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, Jackson, Dunton, & Williams, 1995). Automatic evaluation refers to activation of an affective response upon mere exposure to a stimulus, and theoretically, it is the mechanism underlying implicit attitudes (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Wilson, Lindsey, & Schooler, 2000). Implicit attitudes are stable memorial representations that are automatically

<sup>\*</sup> Corresponding author at: Psychosocial Research Group, Level 3, Dickinson Building, Prince of Wales Hospital, Sydney, NSW 2031, Australia. Tel.: +612 9382 3371; fax: +612 9382 3372.

E-mail address: [k.watts@unsw.edu.au](mailto:k.watts@unsw.edu.au) (K. Watts).

activated and are not accessible via conscious retrieval. These differ from explicit attitudes in that the latter require effort and motivation in order to be retrieved (Wilson et al., 2000).

Theoretically, an automatic process develops after extensive practice or training (a process called over learning; Isen & Diamond, 1989). This type of over learning is applicable to the body image domain. Specifically, as a result of repeated exposure to thin idealised messages, females learn that thinness is highly desirable and that overweight is undesirable (Stice, 2001). These associations are likely to have become habitual and automatic and, hence, may be readily activated upon brief exposure to relevant cues. The evaluative or attitudinal component of body image refers to the subjective feelings and attitudes that an individual has towards their body and physical appearance (Slade, 1994). Females frequently evaluate their body in response to thin idealised media that they encounter, often with adverse consequences (Groesz et al., 2002). Encounters with appearance-related stimuli are often fleeting and are, therefore, likely to involve fast automatic processing (see Joshi, Herman, & Polivy, 2004). Despite this, automatic evaluation of body-related stimuli has received less research focus than other information processing constructs, such as selective attention.

#### *Automatic evaluation and the affective priming task*

It has been argued that indirect tasks provide the best means of assessing automatic cognitions and attitudes. An indirect task is one in which the participant is unaware of the constructs that are being assessed (Fazio & Olsen, 2003). One indirect paradigm that is designed to assess automatic evaluation of a concept (called the “prime”) is the affective priming task (Fazio et al., 1986). This paradigm is a modification of the semantic priming task and it consists of pairs of primes (images or words) and targets (words). The task provides a powerful indirect test of automatic activation because participants respond to the target words, not the primes, and exposure to the priming stimuli is brief (less than 500 ms; Fazio et al., 1986; Neely, 1977).

In the standard affective priming task, automatic attitudes are tested by manipulating two key features of the prime and target pairs. First, the emotional match (valence congruence) of the prime and target is varied such that half of the pairs have the same valence (positive prime, positive target or negative prime, negative target), and the remaining pairs have different valence (negative prime, positive target, or vice versa). These comprise the “congruent” and “incongruent” conditions, respectively. The interstimulus delay between the onset of the prime and the target, called the stimulus onset asynchrony (SOA), is also varied such that half of the trials have a short delay and the other half have a long delay. Typically the short SOA is 300 ms and the long SOA is 1000 ms. The participant is instructed to look at the prime and then to decide as quickly as possible whether the following target word is “good” or “bad”, by pressing one of two response keys.

Two important theoretical assumptions underlie this task. First, it is assumed that concepts, including valence,

are linked together in an associative memory network (Bower, 1981). When a concept (the prime) is briefly presented, activation spreads throughout the memory network such that the valence associated with that concept is automatically brought to mind (Bower, 1981; Fazio et al., 1986). For instance, when a positive prime is presented (e.g., an image depicting a slender female), the relevant memory representations, including positive valence, are automatically activated. When a target word of congruent valence (e.g., wonderful) is presented shortly after the prime, the conceptual nodes for positive valence are still activated above baseline. Hence, the participant is able to classify the target word as “good” relatively quickly. In the incongruent condition, when a positive target word is preceded by a negative prime (e.g., an image of thighs with cellulite), negative valence is automatically activated. Because the opposing valence has been activated, the participant is slower to classify the target word as “good”.

Second, it is assumed that at the short SOA, participants do not have time to deliberately retrieve their attitudes (e.g., Neely, 1977) and that fast automatic processes are operating (Bargh, Chaiken, Gendler, & Pratto, 1992; Fazio et al., 1986). The manipulation of SOA, therefore, controls the amount of processing time available to participants and the level of activation of negative or positive evaluation that is operating when the target word is presented. At the brief SOA, the processing advantage afforded to congruent trials is optimal because the prime has just been presented. It is assumed that the congruence effect will not necessarily be evident at the long delay because (a) when given extra processing time, participants engage in controlled, intentional responding that may serve to suppress the effects of automatic activation, or (b) automatic activation has faded by the time the target word is presented (Fazio et al., 1986). Therefore, this classic criterion for automatic evaluation is established when congruent pairings are responded to faster than incongruent pairings at the short SOA but not at the long SOA (as indexed by the interaction between SOA and valence congruence). This pattern of responding has been replicated in many experiments using a variety of primes including words (Fazio et al., 1986), black and white line drawings (Giner-Sorolla, Garcia, & Bargh, 1999), and complex colour images (Hermans, De Houwer, & Eelen, 1994). However, Fazio (2001) has argued that the first condition, the presence of the congruence effect at the short SOA (the parsimonious criterion), is all that is needed to demonstrate automatic evaluation. Automatic activation according to this criterion has been demonstrated by several researchers (e.g., Fazio & Dunton, 1997; Roefs, Herman, MacLeod, Smulders, & Jansen, 2005). The first objective of the current research was to utilise the affective priming task to determine whether females automatically evaluate body-related images, according to both the classic and the parsimonious criteria.

An advantage of the affective priming task is that participants can individually select their primes. This is relevant in the body image domain because females differ in the way that they evaluate specific exemplars of body parts and body shapes. For example, females with high levels of dietary restraint are more likely to associate

certain body parts (e.g., breasts, buttocks, hips) with aversive emotions, including guilt and anxiety, than are individuals with low restraint (Gatellari & Huon, 1997). The primes in the current research were, therefore, individually selected to ensure that the body-related stimuli were personally salient and of high ecological validity. Images of the thin ideal are not representative of the diversity of real women's shapes and sizes (Levine & Smolak, 1998). Hence, images depicting both thin idealised females and larger-sized females were selected as potential primes. Images depicting both body shapes (slim, overweight) and body parts (hips, thighs) were included.

#### *Individual differences and automatic evaluation*

Individual differences in body image disturbance moderate the impact of exposure to thin idealised images (e.g., Posavac, Posavac, & Posavac, 1998; Trampe, Stapel, & Siero, 2007). In general, the duration of exposure to the images in experimental studies has been relatively long. Therefore, participants' responses predominantly reflect controlled, elaborative processing of the stimuli. It is likely that the magnitude of automatic affective processing of body-related stimuli is influenced by individual differences in beliefs and attitudes about body weight and shape. Nevertheless, the moderating impact of individual differences such as appearance schematicity, thin internalisation, body dissatisfaction, and dietary restraint, on automatic responding in the body image domain is largely unexplored.

Cognitive models of body image disturbance predict that females with highly integrated and detailed body image schemas will be more likely to demonstrate automatic processing of body-related stimuli (e.g., Altabe & Thompson, 1996; Markus, Hamill, & Sentis, 1987). This appearance schematicity comprises the cognitive-behavioural component of body image disturbance (Cash & Pruzinsky, 2002). It refers to the degree to which an individual personally invests in his or her physical appearance (Cash, Melnyk, & Hrabosky, 2004). Conceptually, therefore, investment incorporates self-schemas pertaining to the importance of physical appearance in one's life (Cash, 2005). The Appearance Schemas Inventory-Revised (ASI-R; Cash, Melnyk, & et al., 2004) consists of two subscales that assess different aspects of investment. The Self-Evaluative Salience (SES) subscale assesses the extent to which the individual defines his or her self-worth in terms of appearance. The Motivational Salience (MS) subscale assesses attitudes and behaviours relating to the management of one's appearance. Importantly, because previous studies have shown an association between the SES subscale (but not the MS subscale) and dysfunctional body image attitudes (Cash, Jakatdar, & Williams, 2004; Cash, Melnyk, & et al., 2004; Rudiger, Cash, Roehrig, & Thompson, 2007), it was hypothesised that high scores on the SES subscale would be associated with stronger automatic evaluation than low scores on the SES. No differences in responding were predicted as a function of low or high scores on the MS subscale.

Thin internalisation refers to the extent to which an individual endorses socially defined standards of size and attractiveness, and engages in behaviours designed to

attain these ideals (Thompson & Stice, 2001). Conceptually, thin internalisation is closely related to body image investment (Cash, 2005) and hence, the cognitive-behavioural component of body image disturbance. It has been found that high thin internalisers are vulnerable to immediate adverse effects of thin idealised media (e.g., Cattarin, Thompson, Thomas, & Williams, 2000; Heinberg & Thompson, 1995). In a recent meta-analysis, thin internalisation was one of three sociocultural variables that were related to negative body evaluation following exposure to thin idealised images (Cafri, Yamamiya, Brannick, & Thompson, 2005). Thus, it was predicted that high thin internalisers would demonstrate greater automatic evaluation than low thin internalisers.

The attitudinal facet of body image disturbance consists of an attitudinal-evaluative component, as well as the cognitive-behavioural or investment component. The former component is manifested through dissatisfaction with one's appearance, body shape, size, or specific body sites (Cash & Pruzinsky, 2002; Ip & Jarry, 2008). Body dissatisfaction has been examined extensively in experimental studies as a moderator of responses to thin idealised images (Ip & Jarry, 2008). Females who are dissatisfied with their body respond more negatively to thin-idealised images than females who are less dissatisfied (e.g., Groesz et al., 2002; Posavac et al., 1998). It is argued that females with elevated levels of body dissatisfaction are likely to attend to and to evaluate appearance-related stimuli because it is highly relevant to their current body shape or weight concerns. Hence, it was hypothesised that females with high levels of body dissatisfaction would demonstrate stronger automatic evaluation than females with low levels of body dissatisfaction.

Dietary restraint is closely related to body dissatisfaction in causal models of body image disturbance (Stice, 2001). This construct comprises attitudes toward eating, as well as effortful and goal-directed behaviours that are designed to regulate body weight (Polivy, Herman, & Howard, 1988). Because of the effortful nature of dietary restraint, it may be less influential on the automatic evaluative processing of body-related stimuli than other aspects of body image disturbance. On the other hand, restrained eaters, in a similar manner to individuals who are dissatisfied with their body, are likely to attend to and to evaluate appearance-related stimuli because it is highly relevant to their goal of suppressing body weight. Moreover, restrained eating is generally not accompanied by successful weight loss (Polivy, 1996), and this discrepancy closely resembles the current-ideal discrepancy experienced by body dissatisfied females. Therefore, it was predicted that females with high levels of dietary restraint would demonstrate stronger automatic evaluation than females with low levels of restraint.

#### **Experiment 1**

The objective of Experiment 1 was to determine whether females automatically evaluate body-related images and whether these responses are influenced by individual differences in concerns about appearance, weight, shape, and dieting. It was predicted that responses to congruent

trials would be faster than responses to incongruent trials at the short SOA but not necessarily at the long delay. Further, it was predicted that females with high levels of self-evaluative salience, thin internalisation, body dissatisfaction, or dietary restraint would demonstrate a stronger association with automatic evaluation at the short SOA.

## Method

### Design and participants

Experiment 1 employed a (2 × 2) within-participants factorial design. The first factor was the delay between the onset of the prime and target stimulus (SOA). In half of the trials the SOA was short (300 ms) and in the other half it was long (1000 ms). The second factor was the valence congruence of the prime and target pairs. Each prime and target pair had either the same valence (congruent) or different valence (incongruent). Half of the trials were congruent and half were incongruent. The dependent variable was the mean response latency (ms) to the target words. Eighty seven female undergraduate psychology students at the University of New South Wales (UNSW) participated in this experiment in return for course credit. The mean age of the participants was 18.91 years ( $SD = 2.65$  years) and the mean Body Mass Index (BMI) was 21.21 ( $SD = 4.25$ ).

Approval for Experiments 1 and 2 was obtained from the UNSW Human Research Ethics Committee.

### Materials

The experimental stimuli were presented on personal IBM compatible computers using *Inquisit* (version 2.0; Millisecond Software LLC., 2004).

**Prime selection task.** The stimuli consisted of 60 colour images. Forty of these were body-related, including images of body parts (e.g., hips, thighs, eyes), and of body shapes (e.g., flat stomach, slim legs, thighs with cellulite). Most of the images were obtained from recent issues of women's fashion magazines (e.g., *Cosmopolitan*, *Marie Claire*, and *Madison*) and from health and fitness magazines (e.g., *Shape*, *Ultra Fit Australia*, and *Women's Fitness and Health*). Images of large body shapes and sizes were obtained from the website of *Getty Images, Inc. (1999–2005)* because these are difficult to find in women's magazines. The remaining 20 images depicted primarily non-human scenes, and where humans were present, the focus was not on the body or appearance. These items were included as filler items to mask the experimental hypotheses. The majority of the filler images were sourced from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005) and a small number were obtained from the aforementioned website. The criterion for selection was that 10 images depicted pleasant scenes (e.g., a waterfall, a parade) and 10 depicted unpleasant scenes (a spider, a crime scene). The pictures were presented on a black background, and were standardised for size (20 cm × 20 cm) and resolution (28 pixels/cm).

**Affective priming task.** Based upon each participant's fastest response latencies in the prime selection task, 12

body-related and 12 nonbody-related images were extracted idiographically. These provided the priming stimuli in the affective priming task. Within each category, half of the images were "good" and half were "bad". Therefore, there were four categories of primes (body-good, body-bad, nonbody-good, and nonbody-bad). Each prime was followed by a target noun that participants responded to. Twelve of the target words were positive (e.g., *holiday*, *liberty*), and 12 were negative (e.g., *filth*, *terrorist*). Eight of the target nouns were selected from Fazio et al.'s (1986) attitude objects and 16 were selected by the experimenter. Post-experimental ratings confirmed that the participants judged the valence of the target words in a manner consistent with the a priori classification of the experimenter. The two categories of target words were matched for frequency of usage (Carroll, Davies, & Richman, 1971), number of syllables, and length.

### Measures

**Sociocultural Attitudes Towards Appearance Questionnaire-3: Internalisation-General subscale (SATAQ-3-I).** The SATAQ-3-I (Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) measures the extent to which thin appearance ideals have been endorsed as personal standards that are desired or strived for. Sample items include, "I would like my body to look like the people who are on TV" and "I wish I looked like the models in music videos". Participants indicate their level of agreement with each statement using a 5-point scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*). Scores for each item are summed (score range 9–45), with higher scores indicating greater internalisation of the thin ideal. The subscale demonstrates excellent reliability and validity in undergraduate samples (Thompson et al., 2004). Cronbach's alpha was .94 (Experiment 1) and .92 (Experiment 2).

**ASI-R.** The 20-item ASI-R (Cash, Jakatdar, et al., 2004; Cash, Melnyk, et al., 2004) is intended to assess core beliefs and assumptions about the importance of appearance in one's life. The measure yields a total composite score which is comprised of two subscales – the SES (e.g., "What I look like is an important part of who I am", and the MS (e.g., "I often check my appearance in a mirror just to make sure I look okay"). Responses are made on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The entire measure and each subscale is scored by summing the responses for each item and then calculating the mean of the total (score range 1–5), with higher scores indicating greater investment. The ASI-R and its subscales have been validated with undergraduate females and each has high internal consistency (Cash, 2003; Cash & Grasso, 2005; Cash, Jakatdar, et al., 2004; Cash, Melnyk, et al., 2004). Cronbach's alpha for the SES and MS scores was .90 and .81, respectively for Experiment 1, and .86 and .81 for Experiment 2.

**Eating Disorder Inventory: Body Dissatisfaction subscale (EDI-BD).** The EDI-BD (Garner, Olmstead, & Polivy, 1983) is a 9-item measure of dissatisfaction with one's overall shape and with the size of specific body sites. Sample items

include “I think that my stomach is too big” and “I think that my buttocks are too large”. Participants respond using a 6-point forced choice format and indicate whether each statement applies to them (6 *always* to 1 *never*). The inventory was scored as a continuous measure using untransformed scores (score range 9–54), with a higher score indicating greater body dissatisfaction (Schoemaker, van Strien, & van der Staak, 1994). The scale demonstrates high internal consistency (Raciti & Norcross, 1987; Spillane, Boerner, Anderson, & Smith, 2004) and good validity (Garner et al., 1983; Spillane et al., 2004). Cronbach’s alpha was .89 (Experiment 1) and .84 (Experiment 2).

**Restraint Scale (RS).** The RS (Herman & Polivy, 1975) measures attitudinal and behavioural concerns about dieting and weight regulation. Sample items include “what is the maximum amount of weight that you have ever lost in 1 month?” and “do you give too much time and thought to food?” In attempting to modify the scale for an Australian sample (from pounds to kg), Items 2, 3, 4, and 11 were formatted so that the participant could enter a specific weight, instead of using the standard forced choice format. Given the differences in the weight range choices provided in the original items, Items 3 and 4 were scored using one point per 1 kg, and Items 2 and 11 were scored using 1 point per 2 kg. The other items were scored in the standard way. Responses to the 11 scored items were then summed, with high scores representing a high level of dietary restraint (Polivy et al., 1988). The scale produces reliable and valid scores in college-aged females (Herman & Polivy, 1980; Polivy et al., 1988). Cronbach’s alpha was .76 (Experiment 1) and .72 (Experiment 2).

#### *Procedure*

The current experiment was run concurrently with another experiment (not reported here), and the order of participation was counterbalanced. The other experiment was identical to Experiment 1 with the exception that the primes were words rather than images. Because both studies tested automatic, rather than controlled processing, it was expected that the experiment completed first would impact minimally upon responses in the other, and this expectation was confirmed by data analyses. Prior to the experiment that was administered first, participants were told that the research was concerned with women’s thoughts and feelings about words and images commonly used in advertising. The prime selection task was completed first, followed by the affective priming task. The questionnaires were administered just prior to debriefing so as to reduce the potential priming effects of the measures on the indirect tasks.

**Prime selection task.** This task involved the computerised presentation of 60 colour images. The participant had to judge as quickly as possible whether each image was “good” or “bad” by pressing the “Z” or the “1” key on a standard keyboard (the keys were labelled “G” and “B”, respectively). Each image remained on the screen until the participant gave a valid response. Twenty practice trials were administered to familiarise participants with the

task. Consistent with the procedure used by Powell and Fazio (1984) and Fazio et al. (1986), participants’ response latencies were used as the criterion to select the strongest and most robust primes. That is, for each individual, the 12 body- and 12 nonbody- related images which were classified as “good” or “bad” the most quickly were extracted at the end of the task by an Excel macro (version 11.0; Microsoft Office, 2004) and were inserted into the software for the affective priming task.

**Affective priming task.** Each trial involved the presentation of a prime followed by a target noun. Participants were instructed to look at the image but to respond to the word. Their task was to decide quickly and accurately whether the target word was “good” or “bad” by pressing the “Z” or the “1” key. Each target word remained on the screen until a valid response was given. Consistent with other indirect paradigms (e.g., the Implicit Association Test; IAT; Greenwald, McGhee, & Schwartz, 1998), a fast intertrial interval of 500 ms was utilised in the prime selection task and the affective priming task to ensure a rapid rate of stimulus presentation. In both tasks, each word was presented in the centre of a computer screen in black uppercase letters in Arial font (.8 mm high), in a 110 mm × 15 mm white box that, in turn, was set upon a light blue background. Key assignment for “good” and “bad” responses was counter-balanced across participants, and this assignment was consistent across tasks for each individual. Each prime appeared on the screen for 200 ms. At the short SOA, the interval between the offset of the prime and the onset of the target word was 100 ms, giving an SOA of 300 ms (SOA 300). At the long SOA, the interval was 800 ms, giving an SOA of 1000 ms (SOA 1000). The SOA conditions were presented in separate blocks (order counterbalanced). Presentation of the congruent and incongruent trials was semi-randomised, such that half of the primes were paired with positive targets and half with negative targets. This ensured that an equivalent proportion of the four possible valence combinations for each of the prime and target pairs were presented. There were a total of 48 trials in each SOA block, giving a grand total of 96 trials. Following completion of the questionnaires, participants were fully debriefed.

#### *Data reduction and statistical analyses*

The 48 trials containing nonbody-related primes were identified as filler items and were excluded from the data analyses. As is standard in this paradigm, incorrect responses were defined as valence judgments opposite to the actual valence of the target word (e.g., responding “good” to a “bad” target). These comprised 4.16% of the total trials after the practice trials and filler items were removed. These were coded as errors and were also excluded from the analyses (see Fazio et al., 1986). Prior to the calculation of the dependent variable, outlying response latencies were dealt with by a procedure called “winsorising” (Wilcox, 2003). This involves replacing latencies that are more than two standard deviations (SDs) above (or below) the individual’s mean (the criterion) with the value that is exactly two SDs above (or below) the mean. In the current experiment, these trials comprised

**Table 1**  
Mean sample characteristics in Experiments 1 and 2

	Experiment 1		Experiment 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	18.91	2.65	19.28	1.83
BMI	21.21	4.25	21.81	4.10
SES	3.14	0.80	3.20	0.62
MS	3.60	0.67	3.66	0
SATAQ-3-I	27.72	8.60	28.10	6.79
EDI-BD	33.77	9.43	32.35	7.69
RS	18.10	7.41	20.05	8.37

Note. BMI: Body Mass Index, SES: Appearance Schemas Inventory-Revised, Self Evaluative Salience subscale, MS: Appearance Schemas Inventory-Revised, Motivational Salience subscale, Scale to Questionnaire: Sociocultural Attitudes Towards Appearance Scale-3, Internalisation General subscale, EDI-BD: Eating Disorder Inventory, Body Dissatisfaction subscale, RS: Restraint Scale.

5.16% of the total trials. A significance level of alpha equals .05 was used for all analyses.

Moderation by body image concerns was tested using the procedure outlined by Judd, Kenny, and McClelland (2001) for a within participants design. According to this procedure, the criterion variable should represent the difference between the two levels of the independent variable which is then regressed on the potential moderator(s). The latter is a moderator of the effect if it significantly predicts the criterion variable (Judd et al., 2001). In the present experiment, the criterion of automatic evaluation was defined as the difference in mean response latencies for congruent and incongruent trials at the short SOA ( $\text{Mean}_{\text{ShortIncongruent}} - \text{Mean}_{\text{ShortCongruent}}$ ), which was calculated for each individual. A larger positive difference indicated greater automaticity. Following the procedure of Judd et al. (2001), the test of moderation was provided by the simple correlation between each of the individual difference variables with the criterion variable of automatic evaluation. A power analysis confirmed that with a sample of 87 participants there was 81% power to detect a population correlation of .30 (a medium effect; Cohen, 1992) with a significance level (alpha) of .05.

## Results

### Sample characteristics

Table 1 presents the mean sample characteristics. The means for BMI, self-evaluative salience, motivational salience, thin internalisation, and body dissatisfaction were all within the range reported in previous research

with college-aged females (Calogero, Davis, & Thompson, 2004; Cash, Jakatdar, et al., 2004; Cash, Melnyk, et al., 2004; Mazzeo & Espelage, 2002; Tylka & Subich, 1999). The median restraint score for college-aged females generally ranges from 15 to 16 (Polivy et al., 1988). The median in this sample was somewhat higher (median = 18).

### Order effects

To examine potential order effects a 2 (Order of SOA)  $\times$  2 (SOA)  $\times$  2 (Congruence) analysis of variance (ANOVA) of mean response latencies was conducted. There was a significant interaction between order of SOA and SOA condition,  $F(1, 85) = 17.43, p < .001, \text{partial } \eta^2 = .17$ ; Group 1 (SOA 300 first) were slower to respond to short trials than to long trials, and Group 2 (SOA 1000 first) were slower to respond to long trials than to short trials. This pattern is consistent with practice effects such that each group became more proficient at the task as they progressed through it. A one-way ANOVA, however, conducted on the absolute difference in latencies between SOA 300 and SOA 1000 trials confirmed that the size of the order effect did not differ significantly between Group 1 and Group 2. Therefore, subsequent analyses were collapsed across the order of SOA variable, and this is consistent with the procedure of Fazio et al. (1986; Experiment 2).

### Automatic evaluation

Fig. 1 suggests that consistent with expectations, the response latencies for congruent trials were faster than response latencies for incongruent trials at the short SOA. This pattern also occurred at the long SOA. The three-way order analysis provided a test of the classic criterion. The interaction between SOA (300 ms versus 1000 ms) and valence congruence (congruent versus incongruent) however, did not reach significance; thus, the classic criterion was not met. At the short SOA, the mean response latencies for congruent trials were significantly faster than the mean response latencies for incongruent trials,  $F(1, 86) = 5.11, p < .05, \text{partial } \eta^2 = .06$ . Therefore, consistent with the parsimonious criterion, females demonstrated automatic affective responses upon brief exposure to body-related images.

### Individual differences and automatic evaluation

Pearson product moment correlations were conducted to test the potential moderating influence of body image concerns on automatic evaluation (see Table 2). Each of the

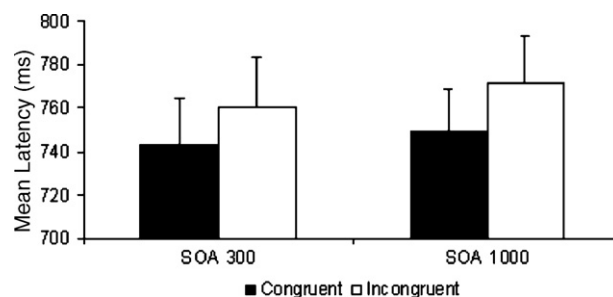


Fig. 1. Mean response latency (ms) as a function of SOA and valence congruence in Experiment 1.

**Table 2**

Pearson product moment correlations for the predictor variables and the criterion of automatic evaluation ( $\text{Mean}_{\text{ShortIncongruent}} - \text{Mean}_{\text{ShortCongruent}}$ ) in Experiment 1 and Experiment 2

	1	2	3	4	5	6
<b>Experiment 1</b>						
SES	1.00	.68**	.66**	.54**	.45**	-.01
MS		1.00	.62**	.27*	.35**	-.07
SATAQ-3-I			1.00	.52**	.42**	-.04
EDI-BD				1.00	.68**	-.10
RS					1.00	.02
Criterion variable						1.00
<b>Experiment 2</b>						
SES	1.00	.60**	.53**	.49**	.32**	.19
MS		1.00	.51**	.25*	.20	.02
SATAQ-3-I			1.00	.28*	.09	.01
EDI-BD				1.00	.56**	.17
RS					1.00	.17
Criterion variable						1.00

Note. SES: Appearance Schemas Inventory-Revised, Self Evaluative Salience subscale, MS: Appearance Schemas Inventory-Revised, Motivational Salience subscale, Scale to Questionnaire: Sociocultural Attitudes Towards Appearance Scale-3, Internalisation General subscale, EDI-BD: Eating Disorder Inventory, Body Dissatisfaction subscale, RS: Restraint Scale. Criterion variable = ( $\text{Mean}_{\text{ShortIncongruent}} - \text{Mean}_{\text{ShortCongruent}}$ ).

\* $p < .05$ , \*\* $p < .01$ .

individual difference variables intercorrelated to at least a moderate degree, but none correlated reliably with the criterion of automatic evaluation. The latter finding indicates that, contrary to expectation, automatic evaluation of body-related images was not moderated by elevated levels of self-evaluative salience, thin internalisation, body dissatisfaction, or dietary restraint.

### Discussion

Automatic evaluation according to the parsimonious criterion was obtained following brief exposure to ecologically valid body-related images. The reliable congruence effect at the short delay provides evidence that affective responses were automatically activated upon brief exposure to individually selected body-related primes. Two aspects of the priming task suggest that these responses were automatic rather than controlled. First, at the short SOA participants did not have enough time to plan and implement a controlled response (Fazio, 2001; Fazio et al., 1986; Neely, 1977). Second, the predicted congruence effect occurred even though the participants were not asked to explicitly report their attitudes toward the primes during the priming task. The second hypothesis that individual differences in body image concerns would moderate automatic evaluation was not supported. The moderator variables were significantly intercorrelated, however none correlated reliably with the criterion of automatic evaluation.

The present experiment provides preliminary evidence that undergraduate female students automatically evaluate body-related images, and the phenomenon does not appear to be moderated by body image concerns. As this is the first experiment to use the affective priming paradigm to test automatic evaluation of body-related

images, a second experiment was conducted with the primary aim of replicating the current findings. Several changes were made in Experiment 2 so that the methodology was more closely aligned to that of Fazio and colleagues (Fazio et al., 1986, 1995). First, the brief ITI of 500 ms was increased in Experiment 2 to 2.5 s. This ITI was successfully utilised by Fazio et al. (1995) when images comprised the priming stimuli. Second, because of the visual complexity of the images, and on the basis of pilot data reported by Fazio et al. (1995), the short SOA was increased from 300 ms to 450 ms and the long SOA was increased from 1000 ms to 1115 ms.<sup>1</sup> Third, memory instructions were included to ensure that participants attended to the primes. Fourth, following Fazio et al. (1986) and Fazio et al. (1995), adjectives rather than nouns were used as the target words in Experiment 2. Affective priming effects have been demonstrated with a variety of target words, including both nouns and adjectives (Fazio, 2001).

A secondary aim of Experiment 2 was to examine the potential moderating influence of the strength of the association between the attitude object (the prime) and its evaluation in memory. Fazio (2001) and Fazio et al. (1986) posited that the strength of this association (coined “associative strength”) influences the likelihood that an affective response will be automatically activated upon encountering the object. Fazio et al. (1986) operationalised associative strength as response latencies in the prime selection task. That is, for each individual, the words with the fastest response latencies were classified as “strong” primes, and those with the slowest response latencies were classified as “weak” primes. In two experiments, participants were faster to respond to congruent prime and target pairs than to incongruent pairs, but only when the primes were strong (Fazio et al., 1986).

It is argued that the associative strength of body-related concepts also varies, and that some body-related images will be more likely to automatically activate affective responses than others. Images with the fastest evaluation latencies were selected as primes in Experiment 1; hence these comprised “strong” primes. In Experiment 2, the first objective was to replicate the findings of Experiment 1 using a methodology more closely aligned to that of Fazio and colleagues (Fazio et al., 1986, 1995), and the second objective was to examine prime strength as a potential moderating factor. The individual difference variables examined as moderators in Experiment 1 were tested again in Experiment 2.

### Experiment 2

It was predicted that response latencies to congruent trials would be faster than response latencies to incongruent trials at the short delay but not necessarily at the long delay. A test of prime strength as a moderator variable

<sup>1</sup> Reliable affective priming has been obtained using complex colour images at SOAs of 300 ms (Hermans et al., 1994) and at SOAs of 450 ms (Fazio, & Dunton, 1997; Fazio et al., 1995).

would indicate whether these response patterns were obtained for strong primes but not for weak primes. The predictions for the individual differences were identical to those for Experiment 1.

## Method

### Design and participants

This experiment employed a ( $2 \times 2 \times 2$ ) within-participants factorial design. The first factor was the delay between the onset of the prime and the target (SOA). The second factor was prime strength (strong, weak). The valence congruence of the prime and target pairs was the third factor (congruent, incongruent). The dependent measure was mean response latency to the target words (in ms). Seventy-two female undergraduate psychology students at the University of New South Wales participated in return for course credit. The mean age of the participants was 19.28 years ( $SD = 1.83$ ) and the mean BMI was 21.81 ( $SD = 4.10$ ).

### Materials

The stimuli in the pilot experiment, the prime selection task, and the affective priming task were presented on personal IBM compatible computers using *Inquisit* (version 2.0; Millisecond Software LLC., 2004). All stimuli appeared in the centre of the computer screen on a light blue background. The words appeared in black uppercase letters in a white box. A reminder of the response options “good” and “bad” appeared in black uppercase letters throughout both tasks in the top left-hand and right-hand corners of the computer screen. The same moderator variables were used as for Experiment 1, namely, appearance investment, thin internalisation, body dissatisfaction, and dietary restraint (described in Section ‘Materials’ for Experiment 1).

**Prime selection task.** A pilot experiment was conducted with 15 graduate psychology students in order to select a wider range of ecologically valid images than utilised in Experiment 1. To ensure a sufficient number of positive and negative images were included, participants rated 95 colour pictures of body parts and body shapes on a 7-point scale, ranging from *very negative* to *very positive*. An image was removed from the pool if it was frequently evaluated as neutral, if participants were consistently unable to identify it, or if it was reported to be ambiguous. The final set of 65 body-related images depicting body parts (e.g., hips, thighs, eyes) and body shapes (slenderness, obesity, cellulite), was used in the prime selection task.

**Affective priming task.** Sixteen body-related images, half with a rating of “good” and half with a rating of “bad”, were extracted idiographically from the prime selection task and comprised the primes in the affective priming task. Based upon the four fastest and the four slowest reaction times in each valence category, half of the primes were classified as “strong” and half as “weak”, respectively. So, there were four categories of primes: strong-good, strong-bad, weak-good, and weak-bad (four primes in each

category). Following Fazio et al. (1986), the fifth category was a nonprime baseline.<sup>2</sup> This consisted of four colour squares, each of which was set upon a white background. Muted pastel colours (lemon, light blue, light green, and pink) were used in order to minimise the possibility of activating an affective response. The nonbody-related filler images were omitted in this experiment. Each prime was followed by a target adjective which the participant was required to respond to. Ten of the target words were positive (e.g., *beautiful*, *magnificent*) and 10 were negative (e.g., *awful*, *miserable*). The words were matched for frequency of usage (Carroll et al., 1971), number of syllables, and length. The full set of images and a list of the target words used in both experiments are available upon request.

### Procedure

Participants were told that the experiment was concerned with women’s attitudes towards health-related words and images commonly used in the media. The prime selection task was completed first, followed by the affective priming task, and the questionnaire measures were administered last, just prior to debriefing.

**Prime selection task.** Sixty-five body-related colour images were presented. The procedure was identical to that of Experiment 1 with two exceptions. First, the number of practice trials was reduced from 20 to 10. Second, 16 primes were extracted for each individual and inserted as the priming stimuli into the software for the affective priming task.

**Affective priming task.** Each trial involved the brief presentation of a prime (colour image) followed by a target adjective. To ensure that participants attended to each prime, they were told that it was a memory item (see Fazio et al., 1986), and that they were to remember the main theme of the picture. Then they had to decide quickly and accurately whether the target word that followed was “good” or “bad” by pressing the “Z” key or the “1” key. Immediately following their judgment of the target, they were instructed to recall (silently) the memory item. The target word remained on the screen until a valid response was given. The ITI was 2.5 s for the prime selection task and the affective priming task. Each prime appeared on the screen for 315 ms. In the short SOA, the interval between the offset of the prime and the onset of the target adjective was 135 ms. In the long SOA, the interval was 800 ms. This gave a short SOA and a long SOA of 450 ms (SOA 450) and 1115 ms (SOA 1115), respectively. The two levels of SOA were presented in separate blocks (order counterbalanced). There were 100 trials in each SOA condition giving a total of 200 trials. Upon completion of the priming

<sup>2</sup> A nonprime baseline was included such that facilitation and inhibition of response latencies, relative to this baseline, could be calculated. There were, however, issues with creating a true baseline and this methodological feature did not contribute significantly to clarifying the results. It was therefore decided to report the results in this experiment using absolute latencies, rather than facilitation and inhibition scores.



task, participants were thanked for their participation and were fully debriefed.

#### Data reduction and statistical analyses

Responses to the nonprime baseline trials were excluded from the analyses. Incorrect responses comprised 4.11% of the total remaining trials. These were coded as errors and were excluded from the data analyses. Outlying latencies were winsorised prior to the calculation of the final means and these comprised 4.60% of the total trials. The tests of automatic evaluation and moderation were conducted using the same approach as in Experiment 1. A power analysis confirmed that with a sample of 72 participants there was 74% power to detect a population correlation of .30 (a medium effect; Cohen, 1992) with a significance level (alpha) of .05.

### Results

#### Sample characteristics

The mean participant characteristics are presented in Table 1. The means for BMI, self-evaluative salience, motivational salience, thin internalisation, and body dissatisfaction were within the range reported in previous research with college-aged females (Calogero et al., 2004; Cash, Jakatdar, et al., 2004; Cash, Melnyk, et al., 2004; Mazzeo & Espelage, 2002; Tylka & Subich, 1999). The median restraint score for college-aged females generally ranges from 15 to 16 (Polivy et al., 1988). The median in this sample was somewhat higher (median = 18.5).

#### Order effects

To examine potential order effects, a 2 (Order of SOA)  $\times$  2 (SOA)  $\times$  2 (Prime Strength)  $\times$  2 (Congruence) ANOVA was conducted on mean response latencies. There was a significant interaction between order of SOA and SOA condition,  $F(1, 70) = 20.43$ ,  $p < .001$ , partial  $\eta^2 = .23$ . Group 1 (SOA 450 first) were slower to respond to short trials than to long trials and Group 2 (SOA 1115 first) demonstrated the opposite pattern. This indicated the presence of practice effects, which was consistent with Experiment 1. A one-way ANOVA confirmed that the size of the order effect did not differ significantly between Group 1 and Group 2. Therefore, subsequent analyses were collapsed across the order of SOA variable.

#### Automatic evaluation

Fig. 2 suggests that response latencies were faster for congruent trials than for incongruent trials at both SOAs. The classic criterion was tested by the (2) (SOA: 450 ms versus 1115 ms)  $\times$  (2) (prime strength: strong versus weak)  $\times$  (2) (congruence: congruent versus incongruent) interaction. Neither the two-way nor the three-way interaction reached significance, and there was a highly significant main effect of congruence,  $F(1, 70) = 13.11$ ,  $p < .01$ , partial  $\eta^2 = .16$ . On average, responses to congruent trials were faster than responses to incongruent trials.

To test the parsimonious criterion, a two-way ANOVA was conducted at the short SOA, with prime strength and valence congruence entered as the factors. The main effect of congruence was significant,  $F(1, 71) = 4.42$ ,  $p < .05$ , partial  $\eta^2 = .06$ , such that responses to congruent trials were faster than responses to incongruent trials at the short SOA. Although Fig. 2 suggests that strong primes produced faster response latencies than weak primes, there were no significant main or interaction effects for prime strength.

#### Individual differences and automatic evaluation

Pearson product moment correlations were conducted to examine the association between the individual differences and the criterion of automatic evaluation (see Table 2). There were significant positive correlations between all of the individual difference variables, with the exception of thin internalisation and motivational salience which did not correlate reliably with dietary restraint. None of the individual difference variables correlated significantly with the criterion variable. The correlation between SES and the criterion showed a trend in the predicted direction ( $r = .19$ ,  $p = .10$ ), such that higher levels of SES were associated with greater automatic evaluation. There were, however, no significant moderating effects of any of the body image variables on automatic evaluation.

### Discussion

Consistent with the findings of Experiment 1, automatic evaluation was evident according to the parsimonious, but not the classic criterion. Again, none of the individual difference variables moderated automatic evaluation. There was, however, a trend in the expected direction

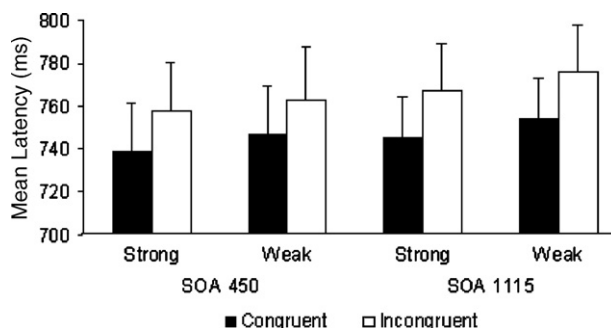


Fig. 2. Mean response latency (ms) as a function of SOA, prime strength, and valence congruence in Experiment 2.

for SES such that higher levels of investment were related to greater automatic evaluation and this trend is consistent with the significant relationship that SES demonstrates with explicit measures of body image evaluation (e.g., Cash, Jakatdar, et al., 2004; Cash, Melnyk, et al., 2004). Although this trend was not evident in Experiment 1, the potential relationship between appearance investment and automatic processing of body-related images deserves further investigation. In general, the current findings suggest that even brief encounters with body-related images are likely to produce automatic affective responses in young women irrespective of body-related concerns.

Contrary to expectation, associative strength (prime strength) did not moderate automatic evaluation. This pattern of findings is consistent with an experiment that used line drawings of strong and weakly valenced objects as primes (Giner-Sorolla et al., 1999). In that study, reliable automatic activation was obtained at a short SOA (250 ms), but the interaction with prime strength was marginally significant. The null effect for prime strength in these studies highlights the ongoing debate in the affective priming literature (Bargh et al., 1992; Chaiken & Bargh, 1993) that challenges Fazio et al.'s (1986) conclusion that the accessibility of an attitude from memory is determined by the strength of the associative link between the attitude object and its evaluation, as measured by prime evaluation response latencies. For example, Bargh et al. (1992) found that automatic activation was reliable for consistently evaluated attitude objects (i.e., attitude objects with slow evaluation latencies that were consistently evaluated as “good” or “bad”), as well as for strong attitude objects (with fast evaluation latencies). It seems, therefore, that a broad range of attitude objects are capable of automatic activation (Bargh et al., 1992) and that affective priming can also be obtained for primes low in associative strength (Klauer & Musch, 2003). The current results, therefore, suggest that a variety of body-related images are likely to activate automatic affective responses, irrespective of the strength of their affective association in memory.

## General Discussion

To our knowledge, this is the first experiment to employ the affective priming task to examine females' automatic evaluation of body-related images. A range of colour images depicting both body shapes and body parts were selected from current women's magazines and the internet as the priming stimuli, and each participant selected her own set of primes which enhanced the ecological validity of both experiments.

### *Automatic evaluation and body-related images*

Consistent with the parsimonious criterion, responses to affectively congruent prime and target pairs were faster than responses to incongruent pairs at the short prime-to-target delay in both studies. The presence of the congruence effect at the short SOA suggests that females' affective responses were automatically activated upon brief exposure to body-related images. In particular, there is evidence that controlled and elaborative processing is

not implemented until at least 500 ms have elapsed from the presentation of a priming stimulus (Neely, 1977). Moreover, the indirect nature of the priming task highlights that participants' responses were automatic rather than controlled. That is, despite participants being instructed to respond to the target words and not the primes, congruent trials were afforded a significant processing advantage relative to incongruent trials at the short SOA when participants did not have sufficient time to plan their responses (Bargh et al., 1992; Fazio et al., 1986).

In the current experiments, the congruence effect at the short delay is consistent with research providing evidence for automatic activation of negative racial attitudes in an affective priming task at a short SOA (450 ms), using photographs of African American and Caucasian faces as the primes (Fazio et al., 1995). The current findings, however, are only partially consistent with an experiment that used complex colour images as both the primes and the targets (Hermans et al., 1994). In that experiment, the nonbody-related images were selected on the basis of extreme positive and negative ratings of “pleasantness” and “unpleasantness” and depicted positive and negative scenes such as a kitten sitting in a windowsill, and a woman's mutilated face, respectively. Consistent with the classic criterion, which was not met in the current studies, participants responded more quickly to congruent pairs than to incongruent pairs at the short SOA (300 ms) but not at the long SOA (1000 ms). A possible reason for the discrepancy in findings at the long SOA relates to the unique nature of the body-related primes utilised in the current research.

At the long SOA, participants have sufficient time to implement controlled, goal-directed responses (Fazio et al., 1986; Neely, 1977). In the current experiments, it appears that even though participants had the opportunity to change the nature of their responses at the long SOA, they were not motivated to do so. Why might this be so? The evaluation of thinness as positive and overweight as negative reflects Western society's idealisation of slenderness and denigration of fatness (Striegel-Moore, Silberstein, & Rodin, 1986; Tiggemann, 2002). Indeed, the stigmatisation of fatness is described as one of the few remaining socially acceptable forms of prejudice (Thompson et al., 1999), and motivation to control fat prejudice is often low (Crandall & Biernat, 1990). In the current studies, therefore, cultural evaluations such as “fat is bad” and “thin is good” may have been primed (Vartanian, Herman, & Polivy, 2005), and at the long SOA, participants may not have felt compelled to modify this anti-fat bias despite having sufficient time to formulate a different response.

### *Body image concerns*

Contrary to expectation, none of the individual differences in body image concerns moderated automatic evaluation. This is consistent with the findings of a recent experiment in which images of females, representing the categories “thin” and “fat”, were paired with “pleasant” and “unpleasant” words in an IAT to provide an implicit measure of thin internalisation (Ahern & Hetherington,

2006). It was predicted that individuals would process schema congruent information more quickly than schema incongruent information. Specifically, high thin internalisers were expected to categorise images representative of “thin” and “fat” more quickly when the category labels were congruent (thin/pleasant and fat/unpleasant) than when the category labels were incongruent (thin/unpleasant and fat/pleasant). These predictions, however, were not supported because none of the explicit measures of thin internalisation, restraint, or body dissatisfaction correlated with the IAT scores (Ahern & Hetherington, 2006).

One possible explanation for the lack of individual differences in automatic evaluation is that the priming task tapped the shared cultural associations between “thinness and good” and “fatness and bad” that most females have been exposed to from an early age (Vartanian et al., 2005). This is consistent with the notion that most females have developed “universal” body image schemas containing rudimentary knowledge, thoughts, and feelings about one’s physical appearance (Markus et al., 1987). Most females, through repeated exposure to the thin ideal, are likely to have developed well-rehearsed, schematic associations in memory between body-related concepts and affective nodes. Hence, when a relevant stimulus is briefly encountered, activation of the body-related representation spreads through the associative memory network to related concepts, including affect (see Bower, 1981), and triggers an affective response: negative valence to “fatness” concepts and positive valence to “thinness” concepts. This is consistent with the literature demonstrating that anti-fat attitudes are widely held (e.g., Teachman, Gapsinski, Brownell, Rawlins, & Jeyaram, 2003). It also suggests that societal standards about body weight and shape are expressed automatically irrespective of individual differences in body image concerns. This may reflect an implicit “normative discontent” with body weight and shape in young western females (Rodin, Silberstein, & Striegel-Moore, 1985).

A potential implication of automatic evaluation is that it may influence subsequent appearance-related information processing and behaviours. For instance, it may underlie the widespread tendency for females to engage in explicit negative evaluation of their bodies (Strahan, Wilson, Cressman, & Buote, 2006), including fat talk (Britton, Martz, Bazzini, Curtin, & LeaShomb, 2006). Furthermore, automatic evaluation may be one of the mechanisms involved in the maintenance of anti-fat bias and discrimination. Fat bias and discrimination are evident in many domains (Puhl & Brownell, 2001), and one experiment has demonstrated that implicit negative attitudes toward fatness predicts subsequent interpersonal behaviour. That is, stronger implicit anti-fat attitudes were associated with individuals choosing to sit further away from an overweight individual (Bessenoff & Sherman, 2000). Future research, therefore, is required to determine the potential link between automatic evaluation, and subsequent cognitions and behaviour, including fat talk, fat prejudice, and discrimination.

Attitude objects that are capable of producing automatic evaluation (“attitude evoking objects”) have been

shown to attract significant visual attention, even when they are irrelevant to the task at hand (Roskos-Ewoldsen & Fazio, 1992). The current research highlights that body-related images constitute attitude evoking objects, suggesting that many of the appearance messages females encounter will automatically and selectively capture their attention. This, in turn, is likely to direct further attention to the stimulus. Females who view thin idealised images under conditions of high attention, experience more weight-focused anxiety than females who view these images under conditions of low attention (Brown & Dittmar, 2005). Future research, therefore, should examine the relationship between automatic evaluation of idealised images and attentional processes and their relative influence on higher order cognitive processing, including elaboration, interpretation, and recall of body-related messages. Such research would also have implications for the use of thin models in advertising.

#### *Limitations and future directions*

There were several limitations of the current research. First, the two samples consisted exclusively of undergraduate females who are not representative of the general population. Clearly the findings require replication in community-based samples and in females from other age groups. Second, if body image concerns do influence automatic evaluation, it is likely to be a small effect. It is acknowledged that there was insufficient power in both experiments to detect small effects. Future research, therefore, is warranted to examine the potential influence of body image concerns in larger samples. Third, explicit responses toward the images were not obtained. Hence, the potential relationship between automatic (implicit) evaluation and explicit attitudinal measures could not be examined. Fourth, it is acknowledged that the memory instructions that were included in Experiment 2 to ensure that participants attended to the images may have inadvertently created a cognitive load. The critical congruence effect, however, was evident at the short SOA, as in Experiment 1. Future research could test the impact of effortful processing on automatic evaluation of body-related stimuli by having participants complete the priming task twice, with and without a competing cognitive load. Fifth, it is acknowledged that the scoring used for four items in the Restraint Scale was nonconventional. The reliability of the scale, however, was satisfactory in both samples and it is unlikely that the modification significantly influenced the critical findings.

The final issue relates to the requirement in the affective priming task that participants judge the target words as “good” or “bad”. It could be argued that this type of judgment is not the first that automatically comes to mind when women encounter body-relevant stimuli. For example, it is possible that females automatically process the *attractiveness* of a body-related stimulus (e.g., “beautiful” versus “ugly”), prior to or even instead of the broad valence of the stimulus. If this is the case, then individual differences, such as thin internalisation, may be more likely to emerge as moderators of “attractiveness-oriented” automatic processing.

## Summary

The current research highlights that females of college age automatically evaluate colour images depicting female body parts and body shapes under conditions of brief exposure. This phenomenon occurred irrespective of whether the images were strongly or weakly associated with a positive or negative evaluation, as indexed by the initial prime selection task. Moreover, automaticity was not reliably moderated by differences in body image concerns. Together, these findings suggest that affective responses are likely to be triggered in most females by a variety of body-related stimuli, which are often only briefly encountered (Joshi et al., 2004). These include thin-idealised media displayed on billboards (Brown & Dittmar, 2005), on public transport, fast-moving images in music videos, and “before and after” images presented in weight-loss articles in women’s magazines. Moreover, because the majority of our encounters with media images are fleeting, the current evidence for females’ automatic processing of these stimuli highlights their “pervasiveness (and invasiveness)” (Joshi et al., 2004, p. 340). In other words, although young women may direct little attention toward these images, these stimuli nevertheless impact upon them in a subtle manner.

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