UNIVERSITY OF CALGARY

The Effect of Thin-Ideal Internalization on Cognitive Processing

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF PSYCHOLOGY

CALGARY, ALBERTA

AUGUST, 2003

FACULTY OF GRADUATE STUDIES

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ABSTRACT

Objective: The present experiment examined the effect of media exposure and thin-ideal internalization on cognitive processing, namely attentional and memory biases in response to body and appearance-related words. **Method:** Female undergraduates (n = 200) viewed photos of either automobiles or attractive swimsuit models, then completed a Lexical Decision Test (Meyer & Schvaneveldt, 1971), word recall test, and two questionnaires assessing eating disorder symptomatology and thin-ideal internalization. **Results:** No attentional bias was found towards body-related words in individuals with high internalization, regardless of media exposure condition. Contrary to expectation, high internalizers resisted negatively valenced appearance-related words, and attended to positively valenced appearance-related words. There were no significant group differences in the recall of body or appearance-related words, suggesting that the media exposure condition was not effective. **Discussion:** Current cognitive models of eating disorders appear too simplistic to account for cognitive processing biases in non-clinical populations. Future research directions are discussed.

Acknowledgements

I would like to express gratitude to my supervisor, Dr. Kristin von Ranson, for encouraging me to pursue a research area that fascinated me and motivating me with her kind words along the way. Her extensive editorial assistance and timely, constructive feedback are also greatly appreciated.

I must also express my appreciation to my committee members, Dr. Chris Sears and Dr. Greg Fouts, and my external examiner, Dr. Susann Laverty, for their helpful comments, as well as their participation at my thesis oral examination. A special thanks is extended to Dr. Chris Sears for remaining patient during my bombardment of methodological and statistical questions, as well as assisting with study design.

I must sincerely thank my parents, Larry and Mary, for always stressing the importance of education and encouraging me to reach my fullest potential, as well as my brother, Jeff, for inspiring me to follow in his footsteps. I am also appreciative of my friends, particularly Amy Baxter, Alice Holub, and Ashli Watt, for providing emotional support every step of the way. A special thanks goes to my fiancé and best friend, Ryan, for encouraging me to pursue a doctoral degree, while also stressing the importance of living a well-balanced life and maintaining diverse interests.

I am also grateful to the men and women with eating disorders I have interviewed over the past year for speaking candidly about their experiences and providing me with inspiration to continue pursuing this important line of research. Finally, I must express thanks to the students who participated in this study, particularly those who voluntarily provided their insights on how the media has affected them.

Dedication

This thesis is dedicated to my friend, Aimee. Through her battle she has inspired me to help others.

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INTRODUCTION

A number of theoretical models have implicated social pressures and media influence in the development of eating disorder (ED) symptomatology (Stice, Schupak-Neuberg, Shaw, & Stein. 1994; Stice, Shaw, & Nemeroff, 1998; Veron-Guidry, Williamson, & Netemeyer, 1997). Research suggests that the mass media, defined as modes of communication that generate messages designed for very large audiences with the goal of maximizing profit (Harris, 1994), are the most potent and pervasive advocates of unattainable sociocultural standards (Heinberg, 1996).

The Sociocultural Model of Eating Disorders

The sociocultural model of EDs asserts that societal factors, particularly as depicted by the visual media, cultivate unrealistic standards of thinness. Due to genetics and the physiology of weight regulation, very few girls or women are able to sculpt their bodies into an idealized shape without resorting to extreme and maladaptive behaviours (Heinberg, Thompson, & Stormer, 1995; Thompson & Heinberg, 1999).

The sociocultural model of EDs is often cited as the most substantiated theoretical explanation for our society's high level of body image disturbance, body dissatisfaction, and the increasing rate of EDs among women (Stormer & Thompson, 1996).

Garner, Garfinkel, Schwartz, and Thompson (1980) were among the first to document the impact of culture on eating disturbances. They reported continuing trends of thinness in *Playboy* centerfolds, Miss America Pageant contestants, and the content of women's magazines over a 20-year period (1959-1978) despite a significant weight increase in American females. Wiseman, Gray, Mosimann, & Ahrens (1992) replicated and extended the research of Garner et al. (1980) to include a more recent 10-year span

(1979-1988) and found that the weights reported for *Playboy* centrefolds were 13%-19% lower than the weight assessed as average based on actuarial tables. These results strongly support the assertion that there has been a gradual but definite evolution in the cultural ideal body shape for women over the past 20 years. Particularly within the past few decades, there has been a shift in the ideal standard toward a thinner size (Spitzer, Henderson, & Zivian, 1999). Both Garner et al. (1980) and Wiseman et al. (1992) suggested that decreases in women's ideal body weight may be associated with increasing rates of anorexia nervosa (AN) and bulimia nervosa (BN); however, these correlational studies cannot ascertain a causal connection.

Self-Discrepancy Theory. According to self-discrepancy theory, the media's presentation of a thin ideal makes body-related self-discrepancies (actual vs. ideal body) chronically accessible (Higgins, 1987; Higgins, Bond, Klein, & Strauman, 1986). The average American woman is 5'3 ¾" tall and weighs 152 pounds (National Center for Health Statistics [NHANES III], 1997); in contrast, Caucasian teenage girls have described their "ideal girl" as 5'7" tall, weighing 100 pounds, and wearing a size 5 (Nichter & Nichter, 1991). Given that the body mass index (BMI) of such an individual is less than 16 kg/m^2, thus falling within the anorexic weight range and likely to have amenorrhea (cessation of menstrual periods), this ideal is clearly unhealthy. The creation of a larger discrepancy between the actual and ideal weight of women may be associated with diminished self-esteem, excessive dieting practices, and clinically significant EDs (Tiggemann & Pickering, 1996).

A plethora of evidence in both clinical and non-clinical samples suggests that the media's presentation of unrealistic ideal images may be causally linked to body image

disturbance (Irving, 1990; Levine & Smolak, 1996; Shaw & Waller, 1995; Waller, Hamilton, & Shaw, 1992). Patients with AN and BN often report that models in fashion magazines have been a source of motivation and guidance in their quest for slenderness and self-control (Levine & Smolak, 1996). In one study, Irving (1990) randomly assigned undergraduate women to view photos of thin, average, or overweight models from fashion magazines. The results indicated that even college women without EDs experienced decrements in self-evaluation and body dissatisfaction following 15 minutes of exposure to photos of thin models. Waller et al. (1992) noted that exposure to thin models for less than 7 minutes can exert the same influence. Studies reveal that brief exposures to thin models (ranging from less than 1 minute to 3 minutes) are associated with elevated levels of depression, anxiety, anger, stress, guilt, shame, insecurity, self-consciousness, and body dissatisfaction (Kalodner, 1997; Pinhas, Toner, Ali, Garfinkel, & Stuckless, 1999; Stice & Shaw, 1994; Stice, Spangler, & Agras, 2001). This finding is particularly distressing because women are relentlessly bombarded with media images. Through various forms of media, Americans are exposed to approximately 3,000 advertisements daily (Kilbourne, 1999). The culturally defined, thin female figure is so pervasive in mainstream Western culture that a substantial proportion of females may be detrimentally influenced by the media (Peterson, Phillips, & Steinhaus, 1996). Although the media have the potential to influence all women, individual differences in susceptibility to media influence may help account for the differential impact of the media in shaping women's attitudes and behaviours (Griffiths et al., 1999; Groesz, Levine & Murnen, 2002; Heinberg & Thompson, 1995; Irving, 1990; Posavac, Posavac,

& Posavac, 1998; Posavac, Posavac, & Weigel, 2001; Stice et al., 2001; Waller et al., 1992).

Further support was demonstrated for the sociocultural influence on EDs in a study examining the relationship between body image dissatisfaction and eating attitudes in visually impaired women. Baker, Sivyer, & Towell (1998) found that congenitally blind women, who had never been exposed to the visual media, had lower body dissatisfaction scores and more positive eating attitudes compared to sighted women and women who were blinded later in life. This finding suggests that visual information, such as the visual media, plays a detrimental role in promoting an unrealistic ideal.

Mediators: Social Comparison and Thin-Ideal Internalization. Recent evidence suggests that the relationship among media exposure, body dissatisfaction, and disordered eating may be mediated by social comparison and internalization. Festinger's social comparison theory, a direct outgrowth of sociocultural theory, has been described as a guide for comprehending the impact of the media on self-evaluation (Festinger, 1954; Irving, 1990; Shaw & Waller, 1995). Festinger's (1954) theory suggests that evaluation of oneself is based on comparison with others and that individual differences in the tendency to make social comparisons may account for differing levels of body dissatisfaction. If the thin, attractive models featured in the media are used as a reference for comparison, a woman is likely to perceive a discrepancy between the accepted standard of female attractiveness and her own body. Consequently, she is lured to view her own body negatively and may develop poor body image (Kalodner, 1997). Exposure to media images makes salient the discrepancy between her conception of her own weight and the standard accepted by society (Posavac et al., 1998). Interestingly, this

comparison generally results in denigration of the self rather than the unrealistic models in the media (Harrison, 2001).

Thin-ideal internalization refers to the extent to which an individual accepts socially defined ideals of attractiveness and engages in behaviours intended to produce an approximation of these ideals (Thompson & Stice, 2001). Internalization of the social comparison ideal directly fosters body dissatisfaction because the ideal is unattainable for most women.

Thin-ideal internalization may help explain why the media detrimentally affects the behaviour of only a subset of the population. The negative influence of the media appears to be most potent for women who demonstrate a pre-existing vulnerability (e.g., internalization of the thin ideal, tendency to engage in social comparison, body dissatisfaction) (Griffiths et al., 1999; Groesz et al., 2002; Heinberg & Thompson, 1995; Irving, 1990; Posavac et al., 1998; Posavac et al., 2001; Stice et al., 2001; Waller et al., 1992). In a longitudinal experiment, adolescent girls were randomly assigned to receive a subscription to *Seventeen* magazine or a no subscription condition (Stice et al., 2001). Several content analysis studies have shown that 45% to 52% of the articles featured in teen fashion magazines such as *Seventeen* focus on appearance (Evans, Rutberg, Sather, & Turner, 1991; Peirce, 1990). At the end of a 15-month subscription period, receiving *Seventeen* magazine had an adverse effect on certain vulnerable girls who were characterized by initial elevations on body dissatisfaction and pressure to be thin. This particular group of girls reported increases in body dissatisfaction, dieting, and bulimic symptomatology. This finding is disturbing because at least 50% of adolescent girls regularly read magazines such as *Seventeen* (Levine & Smolak, 1996).

Posavac et al. (1998) found that exposure to media images results in increased weight concern among women, but that body dissatisfaction is a moderator of vulnerability to this effect. Although most women reported elevated weight concern when exposed to media images as opposed to neutral images, women with low initial body dissatisfaction did not (Posavac et al., 1998). A woman may experience stable body satisfaction if her body is not markedly different from models pictured in the media images (a rarity) or is not an important determinant of her self-worth because she is confident in skills and abilities unrelated to physical attractiveness (Posavac et al., 1998).

The internalization of sociocultural attitudes appears to contribute to body dissatisfaction and disordered eating to a much greater extent than simple exposure to and awareness of prevailing social pressures to be thin and attractive (Cusumano & Thompson, 1997; Stormer & Thompson, 1996). Several studies examining the relationship among internalization, body dissatisfaction, and restrained eating in clinical and non-clinical samples found that acceptance of, and not mere exposure to, thin ideals is associated with body dissatisfaction and restrained eating (Griffiths et al., 1999; Griffiths et al., 2000; Stormer & Thompson, 1996). The possibility of a bi-directional relationship must also be considered. Perhaps restrained eaters with elevated body dissatisfaction are more likely to engage in social comparison and/or internalize societal values.

In one of the most methodologically sophisticated cross-sectional studies in media exposure research, Stice et al. (1994) utilized structural equation modeling to evaluate the role of media exposure on eating disturbances, while also testing for the mediating role of thin-ideal internalization and body dissatisfaction. In addition to finding a direct path

between media exposure and eating disordered behaviours, the researchers discovered that media exposure led to internalization of a slender body shape, which in turn led to body dissatisfaction and eating disordered symptoms (Stice et al., 1994). Festinger's (1954) social comparison theory suggests that a woman should not be dissatisfied with her body unless she has internalized some ideal referent (Stice, 1994). In addition to finding a strong relationship between media exposure and ED symptomatology, this study also points to the existence of several possible mediators.

Limitations of Previous Studies Examining Media Influence. Most of the aforementioned studies suffer from one or both of two major limitations. First, causality cannot be determined from studies that are correlational in nature, such as studies by Garner et al. (1980), Wiseman et al., (1992), and Stormer and Thompson (1996). Based on correlational research, one cannot ascertain whether exposure to media causes the development of weight and shape preoccupation, dieting, and disordered eating practices. It is likely that the relationship between mass media and body dissatisfaction is complex, multiply determined, and bi-directional in that individuals with high body dissatisfaction expose themselves more to media messages (Thompson & Heinberg, 1999; Waller et al., 1994). For example, girls with a high drive for thinness may consult fashion magazines or other forms of media for guidance in aspiring toward an ideal shape, effective weight loss techniques, or personal inspiration. The longitudinal study conducted by Stice et al. (2001) is one of the few studies that have demonstrated a causal link between media exposure, body dissatisfaction, and disordered eating. Second, a substantial proportion of the studies rely exclusively on self-report questionnaires. This can be problematic, particularly in the realm of ED research, for two reasons. First, patients with EDs are

prone to be secretive about their symptoms (Herzog, 1982) and deny the severity of their illness, which may lead to distortion of their responses (Ben-Tovim, Walker, Fok, & Yap, 1989). Second, questionnaires tend to have high face validity. This introduces the problem of demand characteristics, whereby a participant guesses the purpose of the study and intentionally completes the questionnaires in such a way that their data will support the underlying hypothesis (Ben Tovim et al., 1989). Rather than relying exclusively on self-report questionnaires for both predictor and criterion measures, it would be desirable to elucidate the possible cognitive correlates of thin-ideal internalization, such as cognitive biases in response to body and appearance-related stimuli.

Cognitive Biases in Eating Disorders

Cognitive paradigms offer distinct advantages in the study of EDs. Unlike self-report inventories, they often use test strategies that participants are unable to decode and dependent variables that are difficult to falsify (i.e., response latency) (Vitousek & Orimoto, 1993). Consequently, experimental cognitive tests have often been used to assess cognitive biases in patients with EDs because they reduce problems of demand characteristics, response bias, and defensiveness associated with self-reports.

The assumption underlying cognitive biases is that the primary psychopathological concern of an individual automatically biases the processing of information related to that concern, outside of his or her awareness (Vitousek & Hollon, 1990). Eating-disordered individuals develop organized cognitive structures (self-schemas) around issues of weight and its implications for the self (Vitousek & Hollon, 1990). Self-schemas are cognitive generalizations about the self, derived from past

experience, that guide the processing of self-related information in the environment (Markus, 1977). A person who is self-schematic for physical appearance should encode, preferentially process, and react to a diversity of appearance-related stimuli (Cash & Labarge, 1996). Schematic processing is assumed to fulfill a function for the perceiving organism, in that it acts to simplify, organize, and stabilize his or her experience of the self and the external environment (Vitousek & Hollon, 1990). Individuals with AN and BN often describe feeling overwhelmed by the multiplicity of expectations, responsibilities, and choices that impinge on them (Vitousek & Hollon, 1990). They strive to exert self-control in order to reinstate a sense of orderliness and predictability to a world they experience as chaotic (Vitousek & Hollon, 1990). An individual with AN may find relief in the schema-driven simplicity, lack of ambiguity, and comprehensiveness of the anorexic worldview (Vitousek & Hollon, 1990). According to Vitousek and Hollon (1990), the operation of weight-related schemata may also be detrimental and have been implicated in the persistence of ED symptomatology. I am unaware of any studies, however, that have demonstrated an association between cognitive biases and ED duration and/or severity.

Attentional Bias. Attentional bias is one form of cognitive bias that has received much attention in ED research. The assumption underlying attentional biases is that people who are preoccupied with their body shape/size or food will selectively attend to such stimuli (Williamson, 1996). The most widely used technique for examining this hypothesis has been the modified Stroop Test (Mathews & McLeod, 1985). In contrast to the original Stroop Test, in which individuals are asked to name the print colour of a series of colour words (i.e., "red" written in blue ink), the modified Stroop Test presents

emotionally laden or disorder relevant words (i.e., "fat") in place of colour words. The modified Stroop Test provides evidence that colour-naming tests are disrupted by stimuli whose semantic content is similar to the current concerns of the individual, suggesting that there is competition between colour naming and the activation of words whose content matches the subject's schemas (Vitousek & Hollon, 1990). The effect of self-schemata on the processing of self-relevant information can be either inhibitory or facilitatory (Huon, 1995). In the modified Stroop Test, colour naming delay is expected for food and body-related words among individuals with EDs (Ben-Tovim et al., 1989; Cooper & Fairburn, 1992) because the processing of schema-relevant information uses up mental resources and distracts the subject from the primary task (i.e., colour naming) (Vitousek & Hollon, 1990).

Several studies using the modified Stroop Test have reported a selective bias towards the processing of information related to the current concerns of the individual (e.g., food, weight, shape) (Ben-Tovim et al., 1989; Channon, Hemsley, & de Silva, 1988; Green & Rogers, 1993; Huon & Brown, 1996; Perpina, Hemsley, Treasure, & deSilva, 1993; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998). Findings from studies employing the modified Stroop Test are mixed, however, regarding the group of individuals displaying the greatest colour naming latency (e.g., individuals with AN or BN) and the type of stimuli resulting in the greatest colour naming latency (e.g. words pertaining to weight, shape, body parts, food).

Ben-Tovim et al. (1989) found Stroop interference for body and food-related words relative to neutral words in individuals with AN and BN as well as controls. Although all three groups exhibited an attentional bias, Stroop interference for food-

related words was significantly greater in individuals with AN and BN relative to controls, whereas interference for body-related words was significantly greater only in individuals with BN. Channon et al. (1988) also found evidence for Stroop interference for food-related words in individuals with AN as well as controls. Again, the interference was greater in those with AN. In contrast, Sackville et al. (1998) reported Stroop interference for body-related words in individuals with AN, but not for food-related words, suggesting findings are mixed regarding the type of stimuli resulting in the greatest colour naming latency for each diagnostic group.

The modified Stroop Test has also been used to examine whether attentional biases are found in individuals characterized by high dietary restraint. Perpina et al. (1993) and Green and Rogers (1993) reported Stroop interference for both body and food-related words relative to neutral words in individuals with high dietary restraint. In contrast, Sackville et al. (1998) found no evidence for Stroop interference for body or food-related words in individuals with high dietary restraint.

Studies examining whether dieters exhibit an attentional bias towards body and food-related words have also generated mixed findings. Green and Rogers (1993) reported Stroop interference for both body and food-related words in dieters, whereas Huon and Brown (1996) found evidence for an attentional bias towards food-related words only. In contrast, Cooper and Fairburn (1992) did not find support for an attentional bias towards either body or food-related words in dieters. Instead, Stroop interference was limited to individuals with clinical EDs and dieters with a history of ED symptomatology.

In an attempt to elucidate the mixed results that have emerged regarding attentional biases, Dobson and Dozois (in press) recently conducted a meta-analysis examining Stroop performance in individuals with EDs. They concluded that there is evidence for an attentional bias towards body-related words in AN, and towards body and food-related words in BN. The findings are inconsistent across studies, however, and effect sizes tend to be small to moderate. To date, there is little evidence for an attentional bias of any sort in non-clinical dieting samples (Dobson & Dozois, in press).

Dobson and Dozois (in press) proposed that studies examining attentional biases in EDs are limited by the use of unstandardized Stroop methodology. This criticism is discussed in more detail below. In addition, they questioned the common practice of using raw latency scores (colour naming times) rather than interference scores (colour naming times for disorder relevant words, corrected for colour naming times for neutral words) as dependent variables. As a result, colour naming times become confounded with variables such as cognitive deficit, fatigue, and motivation (Dobson & Dozois, in press).

Limitations of Previous Studies Examining Attentional Bias. Previous studies examining attentional biases in individuals with clinical EDs or eating disordered behaviour have suffered from one or more methodological limitations. Several studies used extremely short stimuli sets, some with as few as five words (Ben-Tovim et al., 1989; Cooper & Fairburn, 1992; Cooper & Fairburn, 1993) and presented each word multiple times (Ben-Tovim et al., 1989; Channon et al., 1988; Cooper & Fairburn, 1992; Cooper & Fairburn, 1993; Green & Rogers, 1993; Huon & Brown, 1996; Labarge, Cash, & Brown, 1998; Perpina et al., 1993; Quinton, 1998). This methodology is problematic

because repeated presentation of a particular word results in selective processing due to word familiarity (Dennis & Schmidt, 2003; Erickson & Allred, 2001). The individual is 'primed' to selectively process familiar words because these words have been previously activated. When words are presented repeatedly it is difficult to determine whether a word is preferentially processed due to its familiarity because of repetition priming or its congruence with an individual's pre-existing schema. In addition, several stimuli sets implemented by previous studies were heterogeneous, combining words pertaining to weight, shape, body parts, and food into single lists (Cooper & Fairburn, 1992; Cooper & Fairburn, 1993; Labarge et al., 1998). Mean attentional bias scores are typically calculated for each stimuli set for statistical analyses, making it difficult to determine whether an individual is selectively attending to a particular type of stimulus in a heterogeneous set. For example, a hungry individual may become preoccupied with food and selectively attend to food-related stimuli, but not to body-related stimuli. When food and body-related words are combined in the same stimuli set, however, it is difficult to determine whether particular stimuli subsets are responsible for the attentional bias. Finally, several studies have not reported whether the stimuli sets were matched on key characteristics such as normative word frequency, word familiarity, word length, and/or number of syllables (Boon, Vogelzang, & Jansen, 2000; Huon & Brown, 1996; Perpina et al., 1993). If stimuli sets are not matched on important characteristics, individuals may appear to selectively attend to certain words simply because they are more familiar or require more time to read.

Research examining attentional biases in EDs has suffered from several additional limitations. First, with few exceptions (Rieger et al., 1998; Sackville et al., 1998), the

stimuli sets used in previous studies have focused exclusively on negatively valenced information (e.g., words connoting a large physique). The absence of positively valenced information (e.g., words connoting a thin physique) limits our understanding of body image information processing in EDs. One study by Rieger et al. (1998) suggested that individuals not only preferentially process schema-congruent information, but they also resist counter-schematic information. The preferential processing of information pertaining to an individual's negative body schema has been implicated in the maintenance of body dissatisfaction (Rieger et al., 1998; Vitousek & Hollon, 1990). If a woman focuses on information pertaining to obesity and ignores information linked to thinness, her selective attention may serve to reinforce her beliefs about her own body. In contrast, Sackville et al. (1998) found evidence for Stroop interference for negatively *and* positively valenced body-related words in individuals with AN. The inclusion of both positively and negatively valenced stimuli sets will allow researchers to further examine whether individuals selectively process schema-congruent information *and* resist counter-schematic information, as Vitousek & Hollon's (1990) cognitive theory predicts, or attend to all body-related information, regardless of emotional valence.

Second, studies examining attentional biases to body-related words have generated mixed findings, particularly in non-clinical dieting samples (Dobson & Dozois, in press). Placanica, Gaunce, and Somas-Job (2002) suggested that more potent stimuli may be required to magnify the salience of body-related information in order to reliably detect attentional biases in individuals without clinically diagnosed EDs. Perhaps the results for body-related stimuli have been less consistent in non-clinical samples because these concerns were not activated prior to assessing attentional biases. According to

Beck's cognitive theory (Beck & Emery, 1985), contextual events serve to activate or 'prime' schema-driven processing of self-evaluative information. For some women, media exposure may serve as a schema-congruent trigger, which activates concerns about body size or shape (Altabe & Thompson, 1996). The priming of schemas induces a state of heightened vigilance for and processing of schema relevant information (Labarge et al., 1998), which may result in the hypothesized attentional bias.

Finally, the modified Stroop Test is a weak test of attention. Colour naming delay can arise from attention directed either toward or away from disorder relevant stimuli. Stroop interference suggests that individuals do not process threatening words efficiently (Boon et al., 2000). One may only infer that colour naming delay reflects attentional bias toward certain classes of stimuli; however, it is equally plausible that the increased latencies result from avoidance of threatening information (Boon et al., 2000; Rieger et al., 1998). Two studies assessing attentional biases using the Visual Dot Probe Test, a more direct test of attention, did not find evidence for selective attention or resistance to body-related words in individuals with high dietary restraint (Boon et al., 2000; Rieger et al., 1998).

The Lexical Decision Test. The Lexical Decision Test (LDT) is another cognitive test that provides a more rigorous test of attention (Meyer & Schvaneveldt, 1971). The LDT has been used to investigate semantic networks and strength of associations between word concepts as a way to assess the salient aspects of an individual's cognitive organization. Participants are presented with either a single word or non-word letter string on a computer screen and are required to respond whether the stimulus is a word or not as quickly as possible. The task assumes that the presence of an underlying cognitive

structure (e.g., internalization of the media's thin-ideal, body dissatisfaction) facilitates the recognition of stimulus target words (e.g., faster decision for body-related words than for neutral words) (Meyer & Schvaneveldt, 1971). Although the LDT has been used to examine attentional biases in individuals with anxiety disorders (Rector et al., 2002), I am unaware of any studies that have used the LDT to examine the influence of body self-schemas on the processing of body-related stimuli.

Memory Bias. In contrast to attentional bias, memory bias has been largely unstudied in ED research. The assumption underlying memory biases is that individuals who are preoccupied with body weight/shape allocate additional resources to the processing of body-related information, allowing for greater elaboration of stimuli at encoding. The development of additional retrieval cues during encoding may enhance the ease of recall of body-related information (Sebastian, Williamson, & Blouin, 1996).

King, Polivy, and Herman (1991) found that individuals with EDs demonstrated enhanced recall for weight and food-related information compared to restrained eaters and unrestrained controls. Similarly, Sebastian et al. (1996) reported that individuals with EDs recalled fat words more frequently than weight preoccupied individuals and non-symptomatic controls. A study by Hunt and Cooper (2001) found that women with BN preferentially recalled both positive and negative body-related words compared to emotional words, suggesting that women with BN do not have a general memory bias for all emotionally laden information.

Study Rationale

Research in the area of cognition, media, and EDs has supported two hypotheses.

First, the media's advocacy of a slim 'ideal' body for women may be associated with the increasing prevalence of EDs and body image concerns (Garner et al., 1980; Heinberg et al., 1995; Thompson & Heinberg, 1999; Tiggemann & Pickering, 1996; Wiseman et al., 1992). A limitation of previous studies examining the relationship among media exposure, body dissatisfaction, and disordered eating is the reliance on self-report for both predictor and criterion measures. As previously mentioned, self-reports may be problematic due to demand characteristics, response bias, and defensiveness. To address this issue, cognitive processing paradigms, such as the Stroop Test and Visual Dot Probe Test, have been implemented to examine body-related self-schemas.

Second, individuals with EDs exhibit an attentional and memory bias towards stimuli that are related to their current concerns (Ben-Tovim et al., 1989; Channon et al., 1988; Green & Rogers, 1993; Huon & Brown, 1996; King et al., 1991; Perpina et al., 1993; Rieger et al., 1998; Sackville et al., 1998; Sebastian et al., 1996). However, these studies suffer from one or more methodological limitations. Studies employing different variations of inadequate stimuli sets are difficult to interpret and may not provide an adequate measure of self-schemas and cognitive biases. These limitations challenge the interpretation of previous findings and question our understanding of cognitive biases in EDs.

Study Aims

The present study, which examined whether thin-ideal internalization and media exposure exert an effect on cognitive processing, aimed to improve on the shortcomings of previous studies in the realms of media exposure and cognitive biases. Rather than relying on self-reports for both predictor and criterion measures, a Lexical Decision Test

and word recall test were used to assess attentional and memory biases following priming of body and appearance concerns by exposure to attractive swimsuit models. A study by Cash, Cash, and Butters (1983) demonstrated that women who were instructed to focus on thin, attractive models reported immediate dissatisfaction with their overall appearance on a self-report questionnaire. However, I am unaware of any studies assessing the processing of stimuli pertaining to overall appearance.

The aims of the present study were threefold: 1) to develop four improved stimuli sets pertaining to body weight/shape and overall physical appearance for the purpose of examining attentional and memory biases; 2) to examine whether high internalization is associated with attentional and/or memory biases for body and/or appearance-related stimuli sets; 3) to examine whether exposure to the thin-ideal promoted by the visual media is associated with attentional and/or memory biases for body and/or appearance-related stimuli sets.

Based upon existing research findings, I hypothesize that: 1) individuals with high internalization will exhibit attention and memory biases for negatively valenced body and appearance-related stimuli sets, compared to those with low internalization; 2) individuals with high internalization will resist and have poor recall of positively valenced body and appearance-related stimuli sets, compared to those with low internalization; 3) these attention and memory effects will be strongest for individuals primed with exposure to attractive swimsuit models. A 2 (low vs. high internalization) x 2 (no media exposure vs. media exposure) x 2 (negative vs. positive stimuli) split-plot design was used to examine the interaction among internalization, media exposure, and stimuli valence, separately for body-related words and appearance-related words.

STUDY ONE: METHOD

Participants

Fifty female undergraduates taking psychology courses at the University of Calgary voluntarily participated in this study and received course credit for their participation. Participants ranged in age from 17 to 25 years and spoke English as their first language.

Materials and Measures

Body Mass Index (BMI=Kg/M^2): The BMI is a rough measure of adiposity (Manson, Skerrett, & Willett, 2002). It correlates highly with more complex methods of measuring body mass such as skinfold thickness and body density measurements (Garrow & Webster, 1985).

Sociocultural Attitudes Towards Appearance Questionnaire (*SATAQ*; Heinberg et al., 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 SATAQ contains 2 subscales. The 6-item Awareness Scale and 8-item Internalization Scale have both demonstrated good internal consistency reliability in a female undergraduate sample (Heinberg et al., 1995). The SATAQ converges with several existing measures of body image disturbance and eating dysfunction (Heinberg et al., 1995). Sample items include, "Attractiveness is very important if you want to get ahead in our culture" (Awareness), and "I wish I looked like a swimsuit model" (Internalization).

Minnesota Eating Disorder Inventory (M-EDI; Klump, McGue, & Iacono, 2000; von Ranson, Klump, Iacono, & McGue, 2003). The M-EDI is a 30-item 4-point Likert-

scaled self-report questionnaire assessing dysfunctional eating attitudes and behaviours. The M-EDI includes four subscales, which were derived by factor analysis (Klump et al., 2000): 1) Weight Preoccupation (8 items); 2) Body Dissatisfaction (6 items); 3) Binge Eating (7 items), and; 4) Compensatory Behaviours, such as self-induced vomiting, use of laxatives and diuretics, and fasting (6 items). After items are recoded so that all items are scored in the pathological direction, scale scores are derived by the summation of all subscale item scores, and a total score, which indexes overall eating pathology, is obtained by summing all items. The M-EDI has demonstrated good internal consistency reliability, convergent validity, and divergent validity in a female undergraduate sample (von Ranson, Cassin, & Bramfield, 2003) and in community samples of girls and women (von Ranson et al., 2003).

Photo Rating Equipment: Software for a program entitled DMDX (Forster, 1999) was downloaded from the University of Arizona Department of Psychology website and used to display photos on an 18 inch Samsung SyncMaster 900NF monitor using an Advanced Configuration and Power Interface (ACPI) Personal Computer. All photos were approximately 4 x 6 inches as they appeared on the screen, coloured and presented on a black background. Photos depicted thin, attractive swimsuit models found in the visual media. Each photo was presented on the screen automatically for 10 seconds. Participants pressed the space bar after rating each photo in order to proceed to the next photo.

Procedures

Individuals participating in study one read and signed a consent form and completed a demographics questionnaire containing questions regarding age, marital

status, ethnicity, education level, and occupation. Participants were then presented with a list of 233 words under consideration for inclusion in the stimuli sets and were asked to classify each word into one of six groups: 1) "fat"; 2) "thin"; 3) "unattractive"; 4) "attractive"; 5) "other"; or 6) "unsure." Participants were instructed to place a word in the "other" group if it did not appear to belong to any of the four experimental categories, or the "unsure" group if they were unsure of its meaning.

Following the word classification task, participants were asked to rate the valence of each word on a scale from –3 ("very negative") to +3 ("very positive"). In addition, they were asked to rate the familiarity of each word on a scale from 0 ("never seen or heard the word") to 9 ("as common as 'the' or 'a'"). This task served to categorize words, evaluate the valence and familiarity of words, and to identify words that subjects were not familiar with. The normative frequency of each word was determined using an index of American English published by Kucera & Francis (1967). This index reports the number of times each word is presented in print per one million words.

In the second part of this study, participants completed a photo-rating task. Twenty-five full-length photos of female swimsuit models were presented on the computer screen. They were asked to rate the overall physical appearance of each model, taking both face and body into consideration, on a scale from 1 ("very unattractive") to 10 ("very attractive"). This task served to select the 15 most attractive models for inclusion in study two because these models would likely be most representative of those found in the visual media.

In the last part of study one, participants completed the SATAQ (Heinberg et al., 1995) and the M-EDI (Klump et al., 2000; von Ranson et al., 2003). A question asking

participants to estimate their height and weight was added to the beginning of the M-EDI in order to calculate BMI for each participant. This information was collected in order to examine the relationship among BMI, eating pathology, and sociocultural attitudes towards appearance, as well as to compare the BMI of participants in study one with those in study two. All participants were debriefed about the purpose of the study upon completion.

Statistical Analysis

For a word to be considered for inclusion in the final stimuli sets, more than 70% of participants had to place the word into the same category and fewer than 10% of participants could be unsure of its meaning. These cut-offs were selected in order to maximize the size of the stimuli sets, while also maintaining reasonable agreement about categorization. Of the words that met both of these criteria, stimuli sets were constructed such that the number of syllables, word length, word frequency, and word familiarity were comparable. One-way analysis of variance (ANOVA) tests were performed to compare the valence of the different word groups and to ensure that the fat, thin and neutral stimuli sets and the unattractive, attractive, and neutral stimuli sets were matched on number of letters, number of syllables, word frequency, and word familiarity. The Bonferroni correction was employed to control the family-wise error rate; thus, all significance tests were conducted with an alpha of 1%. Follow-up Bonferroni t-tests (alpha = .005) were conducted to examine significant ANOVAs.

A mean rating of overall appearance was calculated for each of the twenty-five photos of swimsuit models. The fifteen models receiving the highest mean ratings were selected for inclusion in study two.

STUDY ONE: RESULTS

Participant Characteristics

Participants had a mean age of 19.7 years (SD = 1.7) and 2.5 years (SD = 1.2) of post-secondary education. The sample consisted of Caucasian (72.0%), Asian (14.0%), East Indian (12.0%), and mixed ethnicity (2.0%) women. The sample was predominantly single (92%). Body mass index (BMI) of participants ranged from 16.6 to 48.1 kg/m^2. The mean BMI of 22.3 kg/m^2 falls within the average range (Weinsier & Kushner, 2002).

Stimuli Set Ratings

The mean ratings of fat, thin, unattractive, attractive, and neutral word descriptors are presented in Table 1. Preliminary statistical analyses were conducted on twenty words from each of the experimental stimuli sets and 80 neutral words. As described below in more detail in the Methods section of study two, these preliminary stimuli sets were revised post hoc for two reasons. First, five items in the stimuli sets were eliminated due to high (>30%) error rates on the LDT. Second, eleven items were eliminated in order to better match the stimuli sets on word familiarity because familiarity is a potential confounding variable when interpreting attentional and memory biases. Thus, the results described below are for the revised stimuli sets that were used in the statistical analysis of study two.

One-way ANOVAs were conducted separately for fat, thin, and neutral words, and for unattractive, attractive, and neutral words. The fat, thin, and neutral words were matched for number of letters, $F(2, 109) = 1.23$, $p = .30$, number of syllables, $F(2, 109) = 1.38$, $p = .26$, frequency, $F(2, 109) = .22$, $p = .81$, and familiarity, $F(2, 109) = .38$, $p = .69$. As expected, the stimuli sets were not matched for valence, $F(2, 109) = 87.89$, $p <$

.001 (Table 1). Follow-up Bonferroni tests indicated that fat words were rated significantly more negatively than both thin and neutral words, which did not differ from one another.

The unattractive, attractive, and neutral words were also matched for number of letters, $F(2, 105) = 2.02, p = .14$, number of syllables, $F(2, 105) = .41, p = .67$, frequency, $F(2, 105) = 2.06, p = .13$, and familiarity, $F(2, 105) = 2.11, p = .13$. As expected, stimuli sets were not matched for valence, $F(2, 105) = 344.94, p < .001$ (Table 1). Follow-up Bonferroni tests indicated that unattractive words were rated significantly more negative than neutral words, whereas attractive words were rated significantly more positive than neutral words. The words included in the final fat, thin, unattractive, attractive, and neutral stimuli sets are presented in Appendices A, B, C, D, and E, respectively.

STUDY ONE: DISCUSSION

The purpose of study one was to improve upon the methodological limitations of previous studies implementing cognitive processing paradigms by developing larger, homogeneous stimuli sets including both negatively and positively valenced stimuli sets, matched on such characteristics as word frequency, word familiarity, word length, and number of syllables. The finding that the body-related and the appearance-related stimuli sets are statistically matched on all aforementioned characteristics suggests that these aims were achieved. Study one was intended to increase the internal validity of study two, allowing greater precision in the interpretation of findings. If stimuli sets are matched on frequency, familiarity, word length, and number of syllables, one can infer that participants are attending to particular stimuli because they are congruent with their schemas.

STUDY TWO: METHOD

Participants

Two hundred female undergraduates taking psychology courses at the University of Calgary voluntarily participated in this study and received course credit for their participation. Participants ranged in age from 17 to 25 years and spoke English as their first language.

Materials and Measures

Body Mass Index (BMI=Kg/M^2): The BMI is a rough measure of adiposity (Manson et al., 2002). It correlates highly with more complex methods of measuring body mass such as skinfold thickness and body density measurements (Garrow & Webster, 1985).

Sociocultural Attitudes Towards Appearance Questionnaire (*SATAQ*; Heinberg et al., 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. Refer to the Materials and Measures section on page 19 for further details.

Minnesota Eating Disorder Inventory (M-EDI; Klump et al., 2000; von Ranson et al., 2003): The M-EDI is a 30-item Likert-scaled self-report instrument that assesses dysfunctional eating attitudes and behaviours. Refer to the Materials and Measures section on page 19 for further details.

Photo Rating (Priming) Task: Refer to "Photo Rating Equipment" in the Materials and Measures section on page 20 for further details. Individuals in the experimental condition viewed full-length photos of thin, attractive one-piece swimsuit

models found in the visual media. Similar to a study by Posavac et al. (1998), individuals in the control condition viewed photos of visually appealing sports cars, none of which presented humans. Since individuals in the control condition did not view humans during the priming task, it is unlikely that they experienced activation of body or appearance self-schemas. Control and experimental conditions were identical in all other respects. All photos were approximately 4 x 6 inches as they appeared on the screen, coloured and presented on a black background. Each photo was presented on the screen automatically for 10 seconds. Participants pressed the space bar after rating each photo in order to proceed to the next photo. Although automobiles and attractive models are both presented in the visual media, for brevity I will henceforth use the terms "media exposure" and "no media exposure" to indicate exposure to swimsuit models and automobiles, respectively.

Participants were asked to rate their preference for each product (an automobile or swimsuit) on a scale from 1 ("really dislike") to 10 ("really like"). Each photo was presented automatically for 10 seconds to ensure that each participant received the same duration of exposure (priming). This task was intended to expose individuals in the experimental condition to the thin ideal promoted by the media. The preference ratings were not used in the statistical analysis of the study.

Lexical Decision Test (LDT: Meyer & Schvaneveldt, 1971): A computerized LDT was used to assess attentional biases. Software for a program entitled DMDX (Forster, 1999) was downloaded from the University of Arizona Department of Psychology website and used to conduct the LDT. The LDT began with the presentation of a word or non-word letter string on the centre of an 18 in. Samsung SyncMaster

900NF monitor. Words appeared in green, 0.9 cm., uppercase letters on a black background. Participants were asked to indicate whether the stimulus was a word or non-word as quickly and accurately as possible using one of two shift keys (left shift labeled "non-word", right shift labeled "word"). 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, in press). Timing began when the letter string appeared on the screen and ended when the participant responded by pressing one of two labeled shift keys on the keyboard.

Five stimuli sets were developed in study one for use in the LDT: 1) negatively valenced body-related words (e.g., "fat", "chubby"); 2) positively valenced body-related words (e.g., "slim", "slender"); 3) negatively valenced appearance-related words (e.g., "ugly", "hideous"); 4) positively valenced appearance-related words (e.g., "gorgeous", "pretty"); and 5) neutral words (e.g. "fast", "moist") (see Appendices A - E). The neutral stimuli set was composed of adjectives that are not typically used to describe individuals. It was presumed that study participants were not self-schematic for any neutral stimuli, and thus, would not selectively process words in the neutral stimuli set. Each of the stimuli sets pertaining to body and appearance consisted of 20 words. The neutral stimuli set consisted of 80 words. One hundred and sixty non-words were also selected from a list of non-words previously employed in a cognitive psychology research study at the University of Calgary to match the number of words and non-words, resulting in 320 stimuli in total. Non-words were matched with experimental words in terms of word length and number of syllables. The LDT began with 10 practice trials comprised of 5 neutral words and 5 non-words to ensure that participants understood the task.

Word Recall Task: Following the LDT and a 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

The experiment was described as a "Consumer Preference Study" investigating the effects of self-image on decision-making and preferences for consumer products. All participants began by reading and signing a study consent form and then completed a demographics questionnaire containing questions regarding age, marital status, ethnicity, education, and occupation.

Participants then completed a photo-rating task, as described above. Participants were counterbalanced to either the control (no media exposure) or experimental (media exposure) condition. Those in the control condition viewed photos of automobiles whereas those in the experimental condition viewed photos of swimsuit models. Participants were given the following instructions: "The next part of the study involves indicating your preference for merchandise. You will be presented with fifteen photos, one at a time, on the computer screen. Your task is to rate your preference for each swimsuit (or car) on a scale from 1 to 10, with 1 indicating a swimsuit (or car) that you really dislike and 10 indicating a swimsuit (or car) that you really like. Each photo will be presented for 10 seconds. Press the space bar to proceed to the next photo."

Upon completion of the photo-rating task, participants completed the LDT, as described above. Participants were given the following instructions: "The task you are about to take part in involves decision making. You will be presented with either a real word or a non-word on the centre of the computer screen. An example of a non-word is

"forsude." Notice that it looks and sounds like a real word, but it is not a real word. Your task is to decide whether or not the letters form a real word as quickly and accurately as possible. If it is a real word, press the "word" key on the keyboard (right shift key), and if it is a non-word, press the "non-word" key (left shift key). You will begin with 10 practice trials."

Upon completion of the LDT, participants were asked to write as many numbers as possible in chronological order as part of a timed test. This distraction task was intended to attenuate possible recency effects. Following a two-minute interval, participants were asked to recall as many words as possible from the LDT, excluding practice words. Upon completion of the word recall task, subjects completed the SATAQ (Heinberg et al., 1995) and the M-EDI (Klump et al., 2000; von Ranson et al., 2003). A question asking about participants' height and weight was added to the beginning of the M-EDI in order to estimate BMI for each participant. All participants were debriefed about the purpose of the study upon completion.

Statistical Analysis

Thin-ideal internalization, as measured by the Internalization scale of the SATAQ, is a between subjects categorical independent variable with two groups. Individuals who scored in the upper tertile on the SATAQ Internalization subscale (score ≥ 29) comprised the high internalization group ($n = 70$), whereas those who scored in the lower tertile (score $\leq$ 22) formed the low internalization group ($n = 70$). Data from individuals who scored in the middle tertile on the SATAQ-Internalization scale was excluded from all subsequent analyses. Priming condition is a between subjects categorical independent variable with 2 groups: control (no media exposure) and

experimental (media exposure). Stimuli valence is a within subject independent variable with two types of valence: negative and positive. Statistical analyses were conducted separately to compare response latency and interference scores for negatively and positively valenced body-related stimuli (i.e., fat vs. thin) and for negatively and positively valenced appearance-related stimuli (i.e., unattractive vs. attractive).

Attentional bias, as measured by the mean interference score for each stimuli set, is a continuous dependent variable. Four interference scores were calculated for each subject, corresponding to each of the four experimental stimuli sets (i.e., fat physique, thin physique, unattractive, attractive). Each interference score was calculated by subtracting the mean neutral stimuli set response latency from the mean experimental stimuli set (i.e., fat, thin, unattractive, attractive) response latency. Thus, negative interference scores indicate that participants were quicker to respond to experimental stimuli than to neutral stimuli and positive interference scores indicate that participants were slower to respond to experimental stimuli than to neutral stimuli. Memory bias, as measured by the percentage of words recalled in each stimuli set, 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 the cut-off values employed by Rieger et al. (1998). Lexical decisions that were both incorrect and outliers were categorized as incorrect responses. The percentage of lexical decision errors was also analyzed because it is standard practice to rule out a speed/accuracy trade-off.

A series of planned comparisons was conducted to determine the influence of thin-ideal internalization and media exposure on cognitive processing of body and appearance-related stimuli. Paired samples t-tests were conducted to compare mean response latency for experimental words (i.e., fat, thin, unattractive, attractive) with mean response latency for neutral words to determine whether the interference score was significant (i.e., whether participants exhibited attentional bias or resistance to experimental words). If a significant interference score was found, a paired samples t-test was conducted to compare mean interference scores for negatively valenced words with mean interference scores for positively valenced words. Independent samples t-tests were conducted to examine whether there were group differences on the dependent variables (i.e., LDT interference scores, percentage of LDT errors, recall scores). A 2 (low vs. high internalization) x 2 (no media exposure vs. media exposure) x 2 (negative vs. positive stimuli) split-plot design was used to examine the three-way interaction between internalization, media exposure, and stimuli valence, separately for body-related stimuli and appearance-related stimuli.

An item analysis was conducted to identify and eliminate any stimuli set items with an error and/or outlier rate exceeding 30%. As a result, one word was eliminated from the fat group (i.e., "blubbery"), two from the thin group (i.e., "bone-rack", "wiry"), one from the ugly group (i.e., "nauseating"), and one from the neutral group (i.e., "cylindrical"). Following elimination of these items, the other stimuli sets were revised to ensure that fat, thin, and neutral stimuli sets and unattractive, attractive, and neutral stimuli sets were statistically matched for number of letters, number of syllables, normative frequency, and familiarity. One word was eliminated from the fat group (i.e.,

"big"), three from the unattractive group (i.e., "grotesque", "revolting", "unsightly"), four from the attractive group (i.e., "attractive", "beautiful", "cute", "good-looking"), and three from the neutral group (i.e., "adhesive", "spiky", "tangible"). The attentional and memory bias statistical analyses were performed using only the remaining items (fat = 18 words; thin = 18 words; unattractive = 16 words; attractive = 16 words; neutral = 76 words).

Outliers and incorrect lexical decisions were excluded from mean response latency and attentional bias calculations. One participant in the experimental group who had a combined error and outlier rate exceeding 30% was excluded from all subsequent analyses. The remaining sample (n = 199) yielded an overall error rate of 3.1% and an outlier rate of 2.3%, resulting in the exclusion of 5.4% of the total responses.

STUDY TWO: RESULTS

Observed means, standard deviations, and alpha reliabilities for the SATAQ and M-EDI scores for the entire sample are presented in Table 2.

Participant Characteristics

Demographic characteristics for the control (no media exposure) and experimental (media exposure) groups are presented in Table 3. The mean BMI, SATAQ scores, and M-EDI scores are presented in Table 4. There were no significant differences between groups on any demographic characteristics or questionnaire scores, suggesting that the groups were well matched.

The sample was also subdivided into low and high internalization groups based on their scores on the SATAQ-Internalization scale. Demographic characteristics for the two groups are presented in Table 5. Again, there were no significant differences

between groups on any demographic characteristics. The mean BMI, SATAQ scores, and M-EDI scores are presented in Table 6. As expected, high internalizers scored significantly higher on all SATAQ and M-EDI subscales.

Thin-Ideal Internalization and Media Exposure

Body-Related Words. Response latencies and interference scores for body-related words are presented in Table 7. Relative to neutral words, the low internalization control group responded slower to fat words, whereas the low internalization media exposure group responded faster to thin words. The high internalization groups responded neither slower nor faster to fat or thin words relative to neutral words, regardless of whether they were exposed to swimsuit models. The three-way interaction between internalization, media exposure, and stimuli valence was not significant, $F(1,136) = 0.04$, $p = .85$.

Percentages of lexical decision errors for body-related words are presented in Table 8. The low internalization media exposure group and both high internalization groups had a higher error rate for fat words, whereas only the high internalization media exposure group had a higher error rate for thin words.

Percentages of body-related words recalled are presented in Table 9. Overall, relatively few words (< 19%) were recalled. All four groups recalled significantly more fat and thin words than neutral words, and approximately an equal percentage of fat and thin words (all comparisons, $p > .25$). There were no significant group differences in the percentage of fat or thin words recalled.

Appearance-Related Words. Response latencies and interference scores for appearance-related words are presented in Table 10. Relative to neutral words, all four groups responded slower to unattractive words; however, the low internalization control

group responded to unattractive words significantly slower than the high internalization control group, $t(68) = 2.45, p = .02$. Relative to neutral words, the high internalization groups responded faster to attractive words, regardless of whether they were exposed to swimsuit models. The three-way interaction between internalization, media exposure, and stimuli valence was not significant, $F(1,136) = 0.61, p = .44$.

Percentages of lexical decision errors for appearance-related words are presented in Table 8. The error rates for unattractive and neutral words were not statistically different for any group. Only the high internalization media exposure group had a lower error rate for attractive words.

Percentages of appearance-related words recalled are presented in Table 9. Again, relatively few words (< 13%) were recalled. With the exception of the low internalization control group, the groups recalled significantly more unattractive words than neutral words. All four groups recalled significantly more attractive words than neutral words. There were no significant group differences in the percentage of unattractive or attractive words recalled.

Eating Pathology and Media Exposure

To facilitate comparison with previous studies that have examined cognitive biases in non-clinical populations with low and high ED symptomatology, the data were reanalyzed post hoc after subdividing participants based on their M-EDI total score rather than their SATAQ Internalization score. Individuals who scored in the upper tertile on the M-EDI (score $\geq$ 59) comprised the high M-EDI group ($n = 70$), whereas those who scored in the lower tertile (score $\leq$ 45) formed the low M-EDI group ($n = 69$).

Body-related words. Response latencies and interference scores for body-related words are presented in Table 11. Relative to neutral words, the low M-EDI control group responded slower to fat words. No groups responded slower or faster to thin words relative to neutral words. The three-way interaction between eating pathology, media exposure, and stimuli valence was not significant, $F(1,135) = 0.58$, $p = .45$.

Percentages of lexical decision errors for body-related words are presented in Table 12. The high M-EDI media exposure group had a higher error rate for fat words compared to neutral words. The error rates for thin and neutral words were not significantly different for any group.

Percentages of body-related words recalled are presented in Table 13. All four groups recalled significantly more fat and thin words than neutral words, and approximately an equal percentage of fat and thin words (all comparisons, $p > .10$). There were no significant group differences in the percentage of fat or thin words recalled.

Appearance-Related Words. Response latencies and interference scores for appearance-related words are presented in Table 14. All four groups responded slower to unattractive words relative to neutral words. No groups responded slower or faster to attractive words relative to neutral words. The three-way interaction between eating pathology, media exposure, and stimuli valence was not significant, $F(1,135) = 0.78$, $p = .38$.

Percentages of lexical decision errors for appearance-related words are presented in Table 12. The error rates for unattractive and neutral words were not significantly

different for any group. The high M-EDI media exposure group and both control groups had a lower error rate for attractive words than neutral words.

Percentages of appearance-related words recalled are presented in Table 13. All four groups recalled significantly more unattractive and attractive words than neutral words; however, the low M-EDI groups recalled significantly more attractive words than unattractive words, regardless of whether they were exposed to swimsuit models (both comparisons, $p < .001$). There were no significant group differences in the percentage of unattractive or attractive words recalled.

STUDY TWO: DISCUSSION

The present study examined the effect of the activation (i.e., priming) of body and appearance-related schemas on cognitive processing, namely attentional and memory biases. Although several research studies have examined the effect of dieting, dietary restraint, and ED symptomatology on cognitive processing, this was the first study to examine whether thin-ideal internalization influences cognitive processing. In light of previous studies that have demonstrated a link between thin-ideal internalization, body dissatisfaction, and ED symptomatology (Posavac et al., 1998; Stice, 1994; Stice et al., 1994), it was hypothesized that high internalizers would likely have a negative body self-schema. Following Beck's cognitive model (Beck & Emery, 1985), which states that schematic individuals should not experience schema-governed cognitive functioning unless the schemas are activated (Segal, Gemar, Truchon, Guirguis, & Horowitz, 1995), it was hypothesized that relevant media exposure (i.e., attractive swimsuit models) would serve to activate body and appearance-related self-schemas in high internalizers, producing greater processing biases.

The empirical findings generally do not support Vitousek and Hollon's (1990) cognitive theory of EDs. No evidence was found for an attentional bias towards body-related words in individuals with a high degree of thin-ideal internalization, regardless of whether they were exposed to attractive swimsuit models. Contrary to Vitousek and Hollon's (1990) theory, high internalizers resisted negatively valenced appearance-related words and selectively attended to positively valenced appearance-related words. A speed/accuracy trade-off cannot account for these findings because error rates were comparable for unattractive and neutral words across all groups and error rates were lower for attractive words relative to neutral words. Contrary to hypothesis, there was no support for a three-way interaction among thin-ideal internalization, media exposure, and valence of LDT stimuli. This finding may be partly attributed to the ineffectiveness of the media exposure condition because attentional biases are not expected to occur without the activation of schemas by a relevant stressor (Beck & Emery, 1985). Although high internalizers preferentially recalled body and appearance-related words relative to neutral words, this effect was not limited to negatively valenced words as Vitousek and Hollon's (1990) theory predicts. Furthermore, this effect was evident across all groups, regardless of degree of thin-ideal internalization and media exposure condition, suggesting that the media exposure condition was not effective. A discussion of specific hypotheses follows.

The first hypothesis was that the high internalization group would selectively attend to and preferentially recall negatively valenced body and appearance-related words, and that this effect would be strongest for those who had been primed with media exposure. The data support the existence of a memory bias, but not an attentional bias for fat and unattractive words. Similar to previous studies that have not found evidence for

an attentional bias in dieting or high dietary restraint samples (Boon et al., 2000; Cooper & Fairburn, 1992; Rieger et al., 1998; Sackville et al., 1998), the high internalization group did not selectively attend to fat words, even when primed with media exposure. Contrary to expectation, the high internalization group actually resisted unattractive words, even when primed with media exposure. Similar findings emerged when the sample was divided based on eating pathology on the M-EDI rather than degree of thin-ideal internalization.

The data support a memory bias for negatively valenced body and appearance-related words. However, the memory bias for fat words was not specific to the high internalization media exposure group. In fact, all four groups recalled significantly more fat words than neutral words. The memory bias for unattractive words, however, was limited to the high internalization group.

The second hypothesis was that the high internalization group would selectively resist and have poorer recall for positively valenced body and appearance-related words, and that this effect would be strongest for those who had been primed with media exposure. The data do not support this hypothesis. The high internalization group did not selectively resist thin words, even when primed with media exposure. Contrary to hypothesis, as well as what Vitousek and Hollon's (1990) cognitive theory would predict, the high internalization group actually selectively attended to attractive words. This raises the possibility that high internalizers incorporate ideal appearance into their self-schemas. That is, they attend to positively valenced appearance-related words because these words exemplify the ideal state to be achieved, not because they are schema-congruent. When the data were reanalyzed after dividing groups based on ED

symptomatology rather than degree of thin-ideal internalization, however, the attentional bias for attractive words was lost, suggesting that this finding is specific to those with high thin-ideal internalization.

The data also do not support the hypothesis that the high internalization media exposure group would have poorer recall of positively valenced body and appearance-related words compared to neutral words. In fact, all four groups recalled significantly more thin and attractive words than neutral words, suggesting that there was no effect of priming.

The lack of attentional bias for negatively valenced body-related words in the present study is consistent with findings reported in a recent meta-analytic review of Stroop performance in EDs (Dobson & Dozois, in press). A plethora of studies have concluded that attentional biases are limited to individuals with clinically significant EDs (Cooper & Fairburn, 1992; Rieger et al., 1998; Sackville et al., 1998) and do not distinguish between dieters or restrained eaters and controls (Cooper & Fairburn, 1992; Quinton, 1998). These findings suggest that weight preoccupation, high drive for thinness, and high dietary restraint may be qualitatively distinct from clinically significant EDs (Cooper & Fairburn, 1992). Although many women living in our weight conscious culture may have a negative body self-schema available in memory, an important distinction between those who are dissatisfied and/or preoccupied with weight and those with clinical EDs may be the limited collection of positive body self-schemas available in memory, in combination with a chronically accessible negative body self-schema used to guide information processing (Stein, 1996). If attention and memory biases are attributed to a variable particular to the clinical condition itself rather than

simply being dissatisfied and/or preoccupied with weight, the use of analogue studies to examine attentional biases must be questioned since analogue studies are based on the assumption that non-clinical samples differ only quantitatively from clinical samples. Alternatively, cognitive tests such as the Stroop Test and LDT may not be sensitive enough to detect attentional biases in non-clinical populations.

Some interesting findings from the study are worth discussing. First, the low internalization control group was the only group that did not exhibit a memory bias for unattractive words. In addition, they resisted unattractive words more than any other group and were the only group to selectively resist fat words. Perhaps individuals with low internalization expose themselves less to the media and derive their self-concept from factors other than weight and appearance (e.g., intelligence, athletic ability, relationships with others). As a result, words such as "chunky" and "beefy" may be less familiar and accessible to these individuals, requiring more processing time and resources. Consistent with Vitousek and Hollon's (1990) theory, the finding that individuals with low internalization resist negatively valenced stimuli suggests that low internalization may be a protective factor against the development of discontent with body and appearance because low internalizers are better able to ignore negatively valenced information pertaining to body and appearance. Interestingly, low internalizers who viewed media images no longer resisted fat words; however, they did attend to thin words. The results suggest that for low internalizers only, exposure to thin models may actually activate a positive body self-schema. In the same way that schema-congruent information processing may serve to maintain body dissatisfaction in individuals with a negative body self-schema, schema congruent processing may actually serve to maintain

body satisfaction in individuals with a positive body self-schema. Conversely, low internalizers may have responded to thin words differentially because the words were related to the stimuli they recently observed (i.e., thin models), not because the thin words had special meaning for themselves or their bodies. It should be noted that BMI did not differ significantly across low and high thin-ideal internalization groups (Table 6), thus, group differences are not due to differences in objective body size.

Second, all groups selectively resisted and had poorer recall of unattractive words compared to attractive words. This finding is inconsistent with Vitousek and Hollon's (1990) cognitive theory, which would predict that individuals with high internalization and ED symptomatology who were exposed to relevant media images should selectively resist attractive words and attend to unattractive words. In fact, the results were contrary to expectation. All groups may have resisted unattractive words for a number of reasons. First, several words in the unattractive stimuli set did not specifically describe physical attributes of people. Unlike the words in the fat and thin stimuli sets, which are more typically used to describe physique (i.e., "chubby", "flabby", "slim", "slender"), several unattractive words could be used to describe either people or objects (e.g., "plain", "gross", "dull"). It is possible that individuals were not self-schematic for unattractive words because their reference to physical attributes of people was less obvious. Second, all groups may have resisted unattractive words because they were the least familiar of all the stimuli sets. It seems that unattractive words are less commonly encountered on a daily basis. For example, magazine covers typically boast "how to" articles on losing weight, sculpting flat abdominal muscles, and getting flawless skin. That is, magazines attempt to encourage the reader to make personal changes by providing tips on how to

achieve perfection and prevent weight gain (via the makeup and fat-free food they market). Articles that make direct references to unattractiveness (i.e., how to avoid becoming ugly) are less commonly encountered. It seems that unattractiveness is a taboo topic because, unlike weight, which can be reduced through diet and exercise, unattractiveness can generally only be altered by more drastic techniques such as cosmetic surgery (which typically is not for sale in mainstream magazines). If unattractive words are considered taboo, they may have elicited greater shock value than those in the other stimuli sets and, as a result, may have distracted participants from the lexical decision task at hand. In support of this idea, a study by Sales and Haber (1968) found evidence for a perceptual defense effect, such that undergraduates reported having more difficulty identifying taboo words compared to neutral words.

Third, there were no group differences in the recall of any body or appearance-related stimuli set. With the exception of low internalizing controls, who did not preferentially recall unattractive words, all groups exhibited a memory bias for positively and negatively valenced body and appearance-related stimuli sets. Cognitive theory (Vitousek & Hollon, 1990) would predict that high internalizers would preferentially recall negatively valenced body and appearance-related stimuli whereas low internalizers, if guided by a positive self-schema, may preferentially recall positively valenced body and appearance-related stimuli. The lack of statistical group differences in 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 (Macdougal, 1904), it would be interesting to replicate this study using a recognition task to examine whether a recognition task

facilitates retrieval of schematics' previously encoded body and appearance-related words, yielding differences between groups.

Lack of statistical 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 schemata refer to cognitive structures that code information about what it means to be fat or thin, as opposed to schemata about the self as fat or thin. Due to the weight stereotypes perpetuated in Western culture, individuals with low ED symptomatology or low internalization may be equally disposed to associate thinness with enviable qualities (e.g., success, intelligence, beauty) and obesity with undesirable qualities (e.g., laziness, stupidity, unhygienic). Although most women in our weight conscious culture subscribe to normatively distorted views about weight and appearance, the meaning of weight is more complex, idiosyncratic, and emotionally charged for individuals with EDs because the negative body self-schema becomes the primary referent for inferring personal worth (Vitousek & Hollon, 1990). In the case of weight-related *self*-schemata, the significance of weight is combined with implications for the self.

Markus, Hamill, and Sentis (1987) made a similar distinction between universal and particularistic schemas to account for the lack of group differences in cognitive processing. Universal schemas derive from the most obvious social categories and are acquired by everyone to some degree (e.g., pertaining to age, gender, physical appearance). In contrast, only some individuals acquire particularistic schemas because not all individuals focus on the same characteristics for self-definition. Body and appearance schemas are unique in the sense that they are both universal and

particularistic (Markus et al., 1987). Due to constant evaluation by the self and others, everyone develops thoughts and feelings about their bodies and appearance; however, some individuals focus exclusively on their body or appearance for self-definition. According to Markus et al. (1987), even the most general idea about one's body or appearance may provide enough information to allow one to respond differentially to body and appearance-related stimuli. The lack of attentional biases for body and appearance-related stimuli in the present study suggests that the words were not personally threatening. The presence of memory biases, however, suggests that the participants noticed and elaborated on body and appearance-related words during encoding, facilitating their retrieval.

Finally, although media exposure was intended to prime or activate schemas in high internalizers, the lack of statistical difference between media exposure and control groups on the LDT and recall test suggest that the cover story may have actually been too convincing. That is, participants may have focused their attention primarily on the swimsuit rating task rather than engaging in social comparison with the swimsuit models. A recent study by Cattarin, Williams, Thomas, and Thompson (in press) supports this idea. In their study, undergraduate females were shown either a commercial promoting the thin-ideal or a commercial unrelated to appearance. Participants were either told to compare themselves to the models or to pay close attention to the products being advertised. They found that women given the social comparison instructional set who viewed the appearance-related commercial reported greater decrements in appearance satisfaction than the other groups.

Similarly, Altabe and Thompson (1996) had participants view magazine pictures under one of two instructional sets. Those in the social comparison condition were asked, "How similar are you to this picture and how do you feel about this aspect of your appearance", whereas those in the distracter condition were asked, "How much do you like this picture and what do you think the model is doing?" Altabe and Thompson (1996) found that only the social comparison viewing instructions enhanced negative schema activation. Perhaps if participants in the present study had been instructed to compare their body and appearance with the swimsuit models, the social comparison would have resulted in denigration of the self and subsequent negative schema activation. In support of this idea, individuals in study one, who were asked to rate the overall physical appearance of the models, had higher scores on the M-EDI total score, $t(248) = 2.25$, $p=.025$, and the SATAQ total score, $t(248) = 3.94$, $p < .001$, than those who rated their preference for swimsuits in study two.

In addition, the photos used in the present study differed from those encountered in magazines in one fundamental way. On magazine covers, images of models with perfect bodies and flawless faces are often accompanied by slogans aimed at encouraging social comparisons (i.e., a side profile of a bikini clad fitness model with the slogan, "Flat Abs Now" on the cover of the August 2003 *Shape* magazine). Presumably, the vulnerable reader is expected to perceive a discrepancy between her actual and ideal body, which then motivates her to buy products to help minimize that discrepancy. In the present study, participants were not instructed to engage in social comparison, thus, it is possible that the photos triggered no more self-defeating thoughts than would the mere presence of a physically attractive person. Conversely, 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. Furthermore, it is unclear whether exposure to static images such as photographs parallels the social comparisons that occur in everyday social interactions (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 2002).

Limitations

Although this study had several methodological strengths, a discussion of its limitations is warranted. First, high internal validity was gained at the expense of low external validity. Current cognitive paradigms, which assess attentional biases in response to disorder salient words, have been criticized as lacking in clinical relevance (Lee, Shafran, & Fairburn, 2003). Whether or not individuals attend to body or appearance-related words may contribute little to our understanding of ED psychopathology. 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. It is possible that non-clinical individuals with high internalization and/or high levels of ED symptomatology would selectively attend to negatively valenced body and appearance-related real life images, such as images of obese individuals or a scale indicating a heavy weight.

Second, I am unaware of any studies that have used the LDT to assess attentional biases in ED research and it is possible that the LDT is not sensitive enough to measure attentional biases in non-clinical populations. This criticism is not specific to the LDT, however, and has also been directed at studies using the modified Stroop Test (Dobson & Dozois, in press).

Third, cognitive biases must be interpreted with caution because, unlike the body and appearance-related stimuli sets, the neutral stimuli sets were not semantically homogeneous. Semantic relatedness is a potential confounding variable in that priming from shared meaning may have affected response latency and recall of body and appearance-related words. Future studies should aim to match body and appearance-related stimuli sets with semantically homogeneous neutral stimuli sets in order to help determine whether attentional and memory biases are due to schema-congruent information processing or semantic clustering.

Fourth, it is possible that conducting the experiment in an ED laboratory may have primed all individuals to preferentially recall body-related words. This may help explain why all groups recalled a greater percentage of body-related words than appearance-related words. Although no participants expressed a priori suspicion when questioned about the effectiveness of the cover story during debriefing, it is possible that the location of the experiment may have cast some doubt about the true purpose of the study that participants were reluctant to express.

Fifth, although a cognitive paradigm was used to reduce problems associated with self-reports, the participants were divided into groups based on self-reported internalization and ED symptomatology, introducing potential problems of response bias, demand characteristics, and denial. Presumably, individuals prefer to be of the mindset that they are not vulnerable or easily (and unconsciously) influenced by media moneymaking schemes. If participants responded to the SATAQ based on how they wished they were (ideal self) rather than how they actually are (actual self), the low and

high internalization groups may not reflect actual degree of internalization and the boundaries between groups may be less distinct.

Finally, although I made the assumption that individuals with high internalization and ED symptomatology were self-schematic for weight, it is unknown whether these individuals were actually self-schematic. According to Stice's model (Stice et al., 1994), the association between media exposure and ED symptomatology is mediated by thin-ideal internalization. Although internalization may contribute to the development of a negative body self-schema, the development of a negative body self-schema may not be inevitable. Future studies should include additional questionnaires specifically to assess the presence of body and appearance-related schemas, such as the Appearance Schemas Inventory (Cash & Labarge, 1996).

Conclusions and Future Research

The findings from this study suggest that Vitousek and Hollon's (1990) cognitive theory, which posits that individuals with clinical EDs preferentially process schema-congruent information and resist schema-incongruent information, is too simplistic to account for cognitive processing biases in non-clinical populations. To date, only one study examining attentional biases in EDs has lent support to this theory (Rieger et al., 1998). In contrast, a study by Sackville et al. (1998) found that individuals with AN attended to both negatively and positively valenced body-related words. It will be important for future researchers to assess attentional and memory biases for positively valenced body-related information to help elucidate the mixed findings that have emerged to date regarding counter-schematic information processing.

The findings from this study, together with the meta-analysis by Dobson and Dozois (in press), suggest that the cognitive paradigms commonly used to assess attentional biases may not be sensitive enough to detect differences in non-clinical samples due to minimal effect sizes. It would be interesting to replicate this study using a different instructional set in the media exposure condition in hopes of effectively activating body and appearance-related self-schemas (i.e., direct encouragement of social comparison). It might also be a rewarding enterprise to assess attentional and memory biases in ED patients using the improved stimuli sets, including those pertaining to overall appearance. Furthermore, it would be valuable to assess attentional biases using multiple cognitive paradigms within the same study to see if different paradigms generate similar findings (i.e., Lexical Decision Test vs. modified Stroop Test vs. Visual Dot Probe Test).

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Table 1

Means (and Standard Deviations) of Fat, Thin, Unattractive, Attractive, and Neutral Stimuli Set Descriptors

	Stimuli Type									
	Fat		Thin		Neutral		Unattractive		Attractive	
Stimuli Set Descriptors	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Number of Letters	5.6	(1.7)	6.2	(2.1)	6.5	(2.2)	7.4	(2.5)	7.4	(1.7)
Number of Syllables	1.9	(.7)	1.9	(.7)	2.2	(1.0)	2.4	(1.2)	2.4	(.6)
Frequency	36.1	(86.4)	48.9	(125.6)	36.3	(53.2)	13.8	(18.9)	19.2	(30.0)
Familiarity	6.3	(1.0)	6.3	(1.0)	6.1	(.8)	6.2	(.7)	6.6	(.8)
Valence	-2.0	(.3)	0.0	(1.1)	0.1	(.5)	-2.1	(.5)	2.2	(.2)

Note. Frequency = number of times word is presented in print per million words (Kucera & Francis, 1967). Familiarity ratings were made on a 9-point scale (0 = never seen or heard word before, 9 = as common as 'the' or 'a'). Valence ratings were made on a 7-point scale (-3 = very negative, +3 = very positive).

Table 2

Mean Scores and Alpha Reliabilities for the Sociocultural Attitudes Towards Appearance Questionnaire and Minnesota Eating Disorder Inventory (n = 200)

Scale	*M*	*(SD)*	Alpha
Sociocultural Attitudes Towards Appearance Questionnaire			
Total Score	45.8	(8.0)	.82
Awareness subscale	20.7	(3.6)	.67
Internalization subscale	25.1	(6.3)	.85
Minnesota Eating Disorder Inventory			
Total score	53.4	(13.4)	.92
Weight Preoccupation subscale	15.8	(5.1)	.87
Body Dissatisfaction subscale	14.3	(4.9)	.88
Binge Eating subscale	11.5	(3.6)	.82
Compensatory Behaviors subscale	6.5	(1.1)	.51

Table 3

Comparison of Control and Experimental Groups: Demographic Variables

	Control ($n = 100$)		Experimental ($n = 99$)	
Variable	*M (SD)*	*n* (%)	*M (SD)*	*n* (%)
Age	20.7 (1.8)		21.8 (1.7)	
Education	3.2 (1.2)		3.2 (1.2)	
Ethnicity				
Caucasian		75 (75.0)		77 (77.8)
Asian		14 (14.0)		11 (11.1)
East Indian		5 (5.0)		5 (5.1)
Black		2 (2.0)		0 (0.0)
West Indian		0 (0.0)		1 (1.0)
Other		4 (4.0)		5 (5.1)
Marital Status				
Single		95 (95.0)		91 (91.9)
Married/Cohabiting		5 (5.0)		8 (8.1)

Note. Education = number years of post-secondary education. No group differences were statistically significant.

Table 4

Comparison of Control and Experimental Groups: BMI, SATAQ, and M-EDI Scores

	Control (n = 100)	Experimental (n = 99)
Variable	*M (SD)*	*M (SD)*
BMI	22.3 (3.7)	22.1 (3.3)
SATAQ		
Total score	45.6 (8.1)	45.9 (7.9)
Awareness subscale	20.8 (3.5)	20.6 (3.6)
Internalization subscale	24.9 (6.3)	25.4 (6.2)
M-EDI		
Total score	53.4 (13.8)	53.4 (13.0)
Weight Preoccupation subscale	15.7 (5.4)	15.8 (4.8)
Body Dissatisfaction subscale	14.2 (4.8)	14.3 (4.9)
Binge Eating subscale	11.3 (3.7)	11.7 (3.5)
Compensatory Behaviors subscale	6.7 (1.3)	6.4 (.9)

Note. BMI = Body Mass Index *(BMI=kg/m^2)*; SATAQ = Sociocultural Attitudes Toward Appearance Questionnaire; M-EDI = Minnesota Eating Disorder Inventory. No group differences were statistically significant.

Table 5

Comparison of Low and High Internalization Groups: Demographic Variables

	Low Internalization ($n = 70$)		High Internalization ($n = 70$)	
Variable	*M (SD)*	*n* (%)	*M (SD)*	*n* (%)
Age	20.8 (1.6)		20.7 (1.86)	
Education	3.3 (1.1)		3.0 (1.2)	
Ethnicity				
Caucasian		49 (70.0)		58 (82.9)
Asian		13 (18.6)		6 (8.6)
East Indian		4 (5.7)		3 (4.3)
Black		1 (1.4)		0 (0.0)
West Indian		1 (1.4)		0 (0.0)
Other		2 (2.9)		3 (4.3)
Marital Status				
Single		65 (92.9)		65 (92.9)
Married/Cohabiting		5 (7.1)		5 (7.1)

Note. Education = number years of post-secondary education. No group differences were statistically significant.

Table 6

Comparison of Low and High Internalization Groups: BMI, SATAQ, and M-EDI Scores

	Low Internalization ($n = 70$)	High Internalization ($n = 70$)
Variable	*M (SD)*	*M (SD)*
BMI	21.88 (3.81)	22.59 (3.31)
SATAQ		
Total score *	37.60 (4.87)	53.51 (4.15)
Awareness subscale *	19.39 (3.69)	21.96 (2.85)
Internalization subscale *	18.21 (3.70)	31.56 (2.41)
M-EDI		
Total score *	44.76 (8.84)	64.36 (12.49)
Weight Preoccupation subscale *	12.36 (3.20)	19.80 (4.62)
Body Dissatisfaction subscale *	11.49 (4.21)	17.59 (4.40)
Binge Eating subscale *	10.33 (3.02)	13.39 (3.98)
Compensatory Behaviors subscale *	6.17 (.64)	7.10 (1.34)

Note. BMI = Body Mass Index *(BMI=kg/m^2)*; SATAQ = Sociocultural Attitudes Toward Appearance Questionnaire; M-EDI = Minnesota Eating Disorder Inventory.

*$p < .001$.

Table 7

Response Latency for Body-Related Stimuli (vs. Neutral Stimuli) as a Function of Internalization and Priming Condition

	Low Internalization						High Internalization					
	Control ($n = 35$)			Experimental (Media) ($n = 35$)			Control ($n = 35$)			Experimental (Media) ($n = 35$)		
Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Neutral												
latency	700.0	111.5		705.7	101.9		673.6	78.8		676.8	81.8	
Fat												
latency	723.5	115.1	3.13**	706.2	107.9	0.07	672.7	78.3	0.14	674.7	71.4	0.24
interference	23.5	44.4		.49	40.3		-1.0	41.7		-2.10	50.7	
Thin												
latency	701.0	119.6	0.11	689.3	104.7	2.2*	667.4	82.5	0.97	671.6	80.3	0.72
interference	0.9	49.0		-16.5	44.6		-6.3	38.4		-5.3	43.5	

continued

Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Nonword												
latency	813.7	152.2		838.5	153.6		790.7	125.5		806.5	117.9	

Note. Latency = response latency on Lexical Decision Test; Interference = interference score. Positive interference indicates participants respond slower to experimental stimuli than to neutral stimuli, negative interference indicates participants respond faster to experimental stimuli than to neutral stimuli. $*p < .05$. $** p < .01$

Table 8

Percentage of Lexical Decision Errors for Body and Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Internalization and Priming Condition

	Low Internalization						High Internalization					
	Control ($n = 35$)			Experimental (Media) ($n = 35$)			Control ($n = 35$)			Experimental (Media) ($n = 35$)		
Stimuli Type	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*
Neutral	6.3	6.6		5.2	5.4		4.6	4.0		4.8	4.0	
Fat	7.6	8.8	0.82	9.4	10.5	3.22**	8.4	8.5	3.05**	8.4	8.2	2.86**
Thin	6.5	7.8	0.12	6.5	7.3	1.20	6.2	8.1	1.46	7.1	7.2	2.47*
Unattractive	6.4	8.0	0.07	6.6	7.9	1.34	4.8	5.7	0.24	4.8	7.4	0.04
Attractive	5.0	7.4	1.60	4.8	6.3	0.29	3.4	4.4	1.64	2.3	3.4	3.01**
Nonword	13.8	18.8		17.7	19.4		13.6	16.6		12.0	9.9	

Note. $*p < .05$. $**p < .01$

Table 9

Recall of Body and Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Internalization and Priming Condition

	Low Internalization						High Internalization					
	Control ($n = 35$)			Experimental (Media) ($n = 35$)			Control ($n = 35$)			Experimental (Media) ($n = 35$)		
Stimuli Type	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*
Neutral	3.8	2.8		3.7	2.6		3.5	2.6		2.9	2.5	
Fat	15.4	8.6	7.76**	17.1	9.9	8.16**	16.4	9.1	8.98**	18.6	11.3	8.41**
Thin	15.4	11.8	6.14**	15.2	9.2	7.89**	17.3	18.7	9.10**	18.7	11.2	8.72**
Unattractive	5.7	5.9	1.81	6.8	6.5	2.55*	8.0	7.2	3.55**	6.8	5.3	4.18**
Attractive	12.1	9.3	5.31**	9.5	9.5	3.60**	10.2	7.9	5.09**	11.3	6.8	6.56**

Note. % = Percentage of words recalled from each stimuli set. *$p < .05$. **$p < .01$.

Table 10

Response Latency for Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Internalization and Priming Condition

	Low Internalization						High Internalization					
	Control ($n = 35$)			Experimental (Media) ($n = 35$)			Control ($n = 35$)			Experimental (Media) ($n = 35$)		
Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Neutral												
latency	700.0	111.5		705.7	101.9		673.6	78.8		676.8	81.8	
Unattractive												
latency	745.3	130.0	6.04**	739.1	115.5	4.13**	692.8	88.7	2.54*	705.5	86.9	3.48**
interference	45.3	44.3		33.4	47.9		19.2	44.8		28.7	48.8	
Attractive												
latency	698.7	131.3	0.20	693.5	117.0	1.51	659.1	92.6	2.35*	658.0	86.1	2.7**
interference	-4.3	40.1		-12.2	47.9		-14.5	36.6		-18.8	40.1	

continued

Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Nonword												
latency	813.7	152.2		838.5	153.6		790.7	125.5		806.5	117.9	

Note. Latency = response latency on Lexical Decision Test; Interference = interference score. Positive interference indicates participants respond slower to experimental stimuli than to neutral stimuli, negative interference indicates participants respond faster to experimental stimuli than to neutral stimuli. $*p < .05$. $** p < .01$

Table 11

Response Latency for Body-Related Stimuli (vs. Neutral Stimuli) as a Function of Eating Pathology and Priming Condition

	Low M-EDI Score (≤ 45)						High M-EDI Score (≥ 59)					
	Control (n = 36)			Experimental (Media) (n = 34)			Control (n = 34)			Experimental (Media) (n = 35)		
Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Neutral												
latency	675.4	94.1		704.4	108.2		676.2	93.9		661.7	89.8	
Fat												
latency	691.7	112.9	2.07*	716.9	104.2	1.84	671.5	87.1	0.78	652.4	81.3	1.15
interference	16.3	47.1		12.45	39.6		-4.7	35.5		-9.3	47.6	
Thin												
latency	675.87	94.0	0.06	695.1	108.7	1.21	667.6	95.4	1.39	657.0	87.2	0.62
interference	0.4	-9.4		-9.4	45.3		-8.7	36.2		-4.8	45.1	

continued

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Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Nonword												
latency	802.2	145.1		820.3	134.1		785.7	131.2		794.1	134.6	

Note. M-EDI = Minnesota Eating Disorder Inventory; Latency = response latency on Lexical Decision Test; Interference = interference score. Positive interference indicates participants respond slower to experimental stimuli than to neutral stimuli, negative interference indicates participants respond faster to experimental stimuli than to neutral stimuli. $*p < .05$. $** p < .01$

Table 12

Percentage of Lexical Decision Errors for Body and Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Eating Pathology and Priming Condition

	Low M-EDI						High M-EDI					
	Control ($n = 36$)			Experimental (Media) ($n = 34$)			Control ($n = 34$)			Experimental (Media) ($n = 35$)		
Stimuli Type	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*
Neutral	5.0	4.1		5.9	6.6		5.5	4.9		4.1	3.9	
Fat	5.9	7.3	0.65	8.0	9.9	1.40	6.9	8.3	1.02	7.5	8.1	2.87**
Thin	5.7	7.0	0.66	6.2	6.2	0.31	6.7	9.3	0.99	5.1	6.4	1.25
Unattractive	4.9	5.2	0.17	7.7	7.1	1.76	4.8	5.1	0.65	5.2	7.5	1.08
Attractive	3.1	5.3	2.18*	3.5	5.6	1.87	3.5	4.4	2.59*	2.3	3.4	2.33*
Nonword	12.3	16.8		13.3	16.2		12.6	15.6		13.0	15.0	

Note. M-EDI = Minnesota Eating Disorder Inventory. *$p < .05$. **$p < .01$.

Table 13

Recall of Body and Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Internalization and Priming Condition

	Low M-EDI						High M-EDI					
	Control ($n = 36$)			Experimental (Media) ($n = 34$)			Control ($n = 34$)			Experimental (Media) ($n = 35$)		
Stimuli Type	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*	%	*SD*	*t*
Neutral	3.6	2.9		3.7	3.2		3.1	2.6		3.1	2.9	
Fat	15.9	10.0	7.20**	18.0	9.0	9.80**	15.9	6.9	12.73**	18.3	8.6	10.12**
Thin	15.3	9.5	7.11**	15.4	8.1	8.60**	16.5	9.8	8.65**	17.5	10.0	8.50**
Unattractive	6.1	6.1	2.35*	6.3	5.3	2.53*	6.6	7.4	2.78**	7.3	4.7	4.73**
Attractive	10.9	8.4	5.33**	11.2	7.8	5.54**	9.6	8.5	4.56**	9.8	7.2	5.00**

Note. M-EDI = Minnesota Eating Disorder Inventory. % = Percentage of words recalled from each stimuli set. *$p < .05$. **$p < .01$.

Table 14

Response Latency for Appearance-Related Stimuli (vs. Neutral Stimuli) as a Function of Eating Pathology and Priming Condition

	Low M-EDI Score (≤ 45)						High M-EDI Score (≥ 59)					
	Control ($n = 36$)			Experimental (Media) ($n = 34$)			Control ($n = 34$)			Experimental (Media) ($n = 35$)		
Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Neutral												
latency	675.4	94.1		704.4	108.2		676.2	93.9		661.7	89.8	
Unattractive												
latency	718.8	120.5	5.95**	729.2	119.6	3.16**	700.8	111.1	2.76**	683.5	90.4	2.97**
interference	43.3	43.7		24.8	45.8		24.6	51.8		21.8	43.4	
Attractive												
latency	666.9	119.9	1.08	697.6	120.5	0.79	665.3	110.4	1.63	650.8	97.2	1.51
interference	-8.5	47.1		-6.9	50.7		-10.9	38.9		-10.9	42.7	

continued

Stimuli Type	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*	*M*	*SD*	*t*
Nonword												
latency	802.2	145.1		820.3	134.1		785.7	131.2		794.1	134.6	

Note. M-EDI = Minnesota Eating Disorder Inventory; Latency = response latency on Lexical Decision Test; Interference = interference score. Positive interference indicates participants respond slower to experimental stimuli than to neutral stimuli, negative interference indicates participants respond faster to experimental stimuli than to neutral stimuli. $*p < .05$. $** p < .01$

Appendix A

Fat Stimuli Presented in the Lexical Decision Test

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
beefy	5	2	1	5.40	-2.06
chubby	6	2	2	7.08	-2.00
chunky	6	2	0	6.36	-2.32
enormous	8	3	37	6.50	-2.12
fat	3	1	60	8.30	-2.46
flabby	6	2	0	6.04	-2.16
fleshy	6	2	2	4.98	-1.48
gigantic	8	3	10	6.48	-2.04
heavy	5	2	110	7.26	-1.78
huge	4	1	54	7.12	-1.88
lard	4	1	4	5.24	-2.10
large	5	1	361	7.50	-1.66
obese	5	2	0	6.64	-2.58
overweight	10	3	5	6.96	-2.10
plump	5	1	4	5.64	-1.70
porky	5	2	0	5.10	-2.22
pudgy	5	2	0	5.58	-1.78
tubby	5	2	0	4.86	-1.96

Appendix B

Thin Stimuli Presented in the Lexical Decision Test

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
bony	4	2	7	5.96	-1.44
delicate	8	3	27	6.10	0.68
fragile	7	2	10	6.18	-0.74
lanky	5	2	2	4.60	-0.82
lean	4	1	20	6.48	0.68
narrow	6	2	63	5.92	-0.30
petite	6	2	1	6.48	1.00
scrawny	7	2	4	6.08	-1.12
skeletal	8	3	13	4.84	-1.80
skinny	6	2	9	7.26	-0.66
slender	7	2	19	6.46	1.40
slim	4	1	20	6.96	1.52
small	5	1	542	7.82	0.46
thin	4	1	92	7.66	0.66
tiny	4	2	50	7.54	0.24
toned	5	1	0	6.44	1.94
undersized	10	3	1	4.62	-0.72
underweight	11	3	0	5.74	-0.92

Appendix C

Unattractive Stimuli Presented in the Lexical Decision Test

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
blemished	9	2	2	5.36	-2.18
dull	4	1	27	6.56	-1.74
flawed	6	1	0	5.82	-1.92
gross	5	1	66	7.26	-2.44
grubby	6	2	2	5.56	-1.76
hideous	7	3	11	5.82	-2.73
imperfect	9	3	4	5.82	-1.72
nasty	5	2	5	7.02	-2.42
plain	5	1	48	6.68	-0.84
raunchy	7	2	0	5.64	-2.06
repulsive	9	3	4	5.46	-2.70
sickening	9	3	2	6.02	-2.28
ugly	4	2	21	7.64	-2.76
unattractive	12	4	3	6.88	-2.30
undesirable	11	5	10	5.72	-2.28
unpleasant	10	3	15	5.94	-2.12

Appendix D

Attractive Stimuli Presented in the Lexical Decision Test

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
alluring	8	3	1	5.04	2.08
appealing	9	3	62	6.70	2.30
charming	8	2	24	7.16	2.26
dazzling	8	2	0	5.78	2.10
desirable	9	4	36	6.84	2.28
elegant	7	3	14	6.28	2.12
enchanting	10	3	0	5.54	2.20
flawless	4	2	0	5.96	2.34
glamorous	9	3	5	6.44	2.02
gorgeous	8	2	7	7.60	2.82
lovely	6	2	44	7.14	2.22
pretty	6	2	107	7.54	2.18
sexy	4	2	0	7.86	2.42
striking	8	2	0	5.94	2.06
stunning	8	2	6	6.54	2.38
stylish	7	2	1	7.02	2.00

Appendix E

Neutral Stimuli Presented in the Lexical Decision Test

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
abstract	8	2	34	5.12	-0.10
accessible	10	4	5	5.46	0.40
antique	7	2	12	5.28	-0.20
barren	6	2	7	5.12	-0.20
busy	4	2	58	7.78	0.10
brass	5	1	19	5.04	0.10
breezy	6	2	1	6.84	0.10
calm	4	1	35	7.62	1.00
casual	6	2	22	7.32	0.56
clear	5	1	219	7.08	0.54
cloudy	6	2	2	6.84	-0.58
cluttered	9	2	0	6.00	-1.00
common	6	2	223	7.70	-0.20
crooked	7	2	3	7.02	-0.20
curly	5	2	5	6.46	0.40
damp	4	1	16	7.14	-0.70
dark	4	1	185	6.88	-0.52
decorative	10	4	8	5.86	0.96

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
deep	4	1	109	6.74	0.76
dry	3	1	68	6.76	0.94
dusty	5	2	16	5.54	-0.70
easy	4	2	125	7.42	-0.38
elaborate	9	4	32	5.78	0.70
empty	5	2	64	7.36	-0.30
expensive	9	3	44	7.54	0.02
fast	4	1	78	7.84	0.48
fierce	6	1	8	6.14	-0.94
floral	6	2	3	5.44	0.48
fluffy	6	2	1	5.56	0.10
foggy	5	2	5	5.44	-0.32
formal	6	2	48	6.26	0.64
freezing	8	2	15	6.98	-0.86
fuzzy	5	2	7	5.72	0.18
glossy	6	2	1	5.22	0.50
hazy	4	2	5	6.44	-0.38
heterogeneous	13	5	4	4.30	0.11
homogeneous	11	5	8	4.76	0.21
humid	5	2	1	5.90	-0.04

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
identical	9	4	31	6.18	-0.02
inevitable	10	5	33	5.50	-0.16
instructive	11	3	3	5.29	0.14
intense	7	2	40	6.44	0.62
late	4	1	179	7.18	-0.32
low	3	1	174	7.16	-0.54
mellow	6	2	1	5.72	0.56
metallic	8	3	9	5.60	0.20
moist	5	1	11	5.92	0.04
neutral	7	2	39	6.28	0.12
numerous	8	3	47	6.02	-0.10
objective	9	3	91	6.00	0.48
pointy	6	2	0	6.34	0.10
quiet	5	2	76	7.26	0.30
repetitive	10	4	1	6.00	-0.64
risky	5	2	3	6.28	-0.32
rocky	5	2	10	5.70	-0.24
rubbery	7	3	0	5.20	-0.64
shiny	5	2	3	6.50	0.86
simple	6	2	161	7.04	0.20

Word	Number of Letters	Number of Syllables	Frequency	Familiarity	Valence
spacious	8	2	9	5.58	0.64
speedy	6	2	6	6.06	0.50
spotted	7	2	16	5.12	-0.44
squeaky	7	2	1	5.28	-0.66
striped	7	1	5	5.52	-0.10
subjective	10	3	18	5.60	-0.10
tame	4	1	5	5.36	0.24
tidy	4	2	1	6.38	1.00
traditional	11	4	78	6.10	0.34
triangular	10	4	5	5.06	0.02
tropical	8	3	11	5.54	1.00
twisted	7	2	19	5.02	-0.10
vacant	6	2	11	5.18	-0.24
visible	7	3	34	6.30	0.34
vivid	5	2	25	5.72	1.00
wavy	4	2	2	5.34	0.02
wet	3	1	53	7.26	-0.04
wooden	6	2	50	6.10	0.02

UNIVERSITY OF CALGARY

CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

This is to certify that the Conjoint Faculties Research Ethics Board at the University of Calgary has examined the following research proposal and found the proposed research involving human subjects to be in accordance with University of Calgary Guidelines and the Tri-Council Policy Statement on *Ethical Conduct in Research Using Human Subjects*". This form and accompanying letter constitute the Certification of Institutional Ethics Review.

Applicant(s): Stephanie Cassin

Department/Faculty: Department of Psychology

Project Title: Media and Cognitive Processing

Sponsor (if applicable):

Restrictions:

This Certification is subject to the following conditions:

1. Approval is granted only for the project and purposes described in the application.
2. Any modifications to the authorized protocol must be submitted to the Chair, Conjoint Faculties Research Ethics Board for approval.
3. A progress report must be submitted 12 months from the date of this Certification, and should provide the expected completion date for the project.
4. Written notification must be sent to the Board when the project is complete or terminated.

Chair
Conjoint Faculties Research Ethics Board

Date: 14 August 2002

Distribution: (1) Applicant, (2) Supervisor (if applicable), (3) Chair, Department/Faculty Research Ethics Committee, (4) Sponsor, (5) Conjoint Faculties Research Ethics Board (6) Research Services

09/00