

**An Investigation of Inhibition of Return to Body Information in Young Women
with High or Low Shape/Weight-Based Self-Worth**

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A thesis submitted for the degree of Doctor of Philosophy (Clinical Psychology)
of the Australian National University

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Statement of Originality

This thesis is submitted to the Australian National University in fulfilment of the degree of Doctor of Philosophy (Clinical Psychology). The work presented in this thesis is original, to the best of my knowledge and belief, except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at the Australian National University or any other institution.

A handwritten signature in black ink, appearing to read 'Mimosa Forsyth', with a stylized, cursive script.

Mimosa Forsyth

Date: 12 February 2018

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Conference Presentations

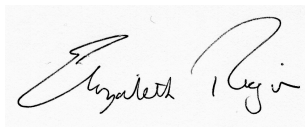
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Elizabeth Rieger



Jason Bell

Abstract

Body image disturbance and disordered eating are widespread problems that are associated with a large number of serious physical and psychological consequences. Current cognitive models of body image disturbance and eating disorders emphasise the central role of an individual's beliefs about the importance of their shape and weight for their self-worth in the development and maintenance of these problems. These beliefs are proposed to partially exert their impact through their effect on information processing. The current research program aimed to investigate differences in one component of attention, namely, attention maintenance regarding body stimuli in individuals who base their self-worth on their shape and weight, using an attentional cuing paradigm, Inhibition of Return (IOR). IOR is an operation of the visual system that inhibits attention from returning to previously attended locations to encourage attention to be directed to new locations.

The first study hypothesised that young women who base their self-worth on their shape and weight would display attentional biases regarding thin-ideal and non-thin body images assessed using an attentional cuing paradigm measuring IOR. The results revealed that participants ($n = 57$) who do not base their self-worth on their shape/weight displayed less attention to non-thin body stimuli compared with control stimuli. This differential pattern of attention was not observed in participants who based their self-worth on their shape/weight.

The second study employed the same spatial cuing paradigm measuring IOR to examine differences in attention for thin and non-thin body words, depending on level of shape/weight-based self-worth. It was found that participants ($n = 105$) who did not base their self-worth on their shape and weight displayed reduced IOR from non-thin body words compared with control words, whereas no difference was found for

participants who based their self-worth on their shape/weight. In combination, the findings from Study One and Study Two revealed an opposite pattern for the processing on non-thin images versus non-thin words in young women with low levels of shape/weight-based self-worth.

The third study provided an investigation of the effect of interpersonal rejection on attentional biases to thin-ideal and non-thin body images in young women ($n = 90$) with high and low levels of shape/weight-based self-worth. The results showed that despite the interpersonal rejection paradigm being effective in reducing self-esteem, it did not modify attentional biases. The results also replicated the findings from Study One in that, irrespective of acceptance/rejection condition, participants who did not base their self-worth on their shape/weight displayed increased IOR for non-thin body images.

Overall, the findings of the current program of research indicate that young women who do not base their self-worth on their shape/weight display differential patterns of attention suggestive of reduced processing of non-thin body images and, possibly, increased processing of non-thin body words. This potentially adaptive pattern was not evident in young women who base their self-worth on their shape/weight. The pattern of results provides novel information regarding protective factors for body image disturbance and eating disorders, thereby suggesting refinements of theoretical models and potentially informing new directions in the prevention and treatment of these conditions.

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Thesis Overview

Cognitive models of body image disturbance and eating disorders posit that an individual's belief about shape and/or weight as an important basis for their sense of self-worth plays a central role in the development and maintenance of disordered eating and maladaptive weight control behaviours. These cognitive structures or schemas that unite beliefs about the self with shape and weight are theorised to have their deleterious impacts at least in part through their effect on information processing, such as biasing attention towards body-related information. The precise nature of these attentional biases is not well understood, with research having yielded highly inconsistent, and even contradictory, findings regarding the attentional processing of shape and weight stimuli. This thesis presents a program of research designed to investigate, and offer some clarification of, the relationship between body image disturbance and biased cognitive processing within a sample of young women, by examining attentional biases regarding body stimuli in individuals with high and low levels of shape/weight-based self-worth.

Chapter One commences with a review of the literature pertaining to body image disturbance and eating disorders, with a focus on the role of an individual's beliefs about the importance of shape and weight for self-worth. Firstly, the definitions, prevalence, and consequences of body image disturbance and eating disorders are outlined. The chapter then presents a summary of cognitive theoretical frameworks of body image disturbance and eating disorders, with an emphasis on information processing biases and, in particular, attentional biases. Finally, the chapter concludes with a review of the potential role of interpersonal factors in triggering these attentional biases in vulnerable individuals.

Chapter Two presents a review of attention and attentional biases. It starts by

outlining the components of attention, and the cognitive tasks that have been most commonly used in research. The chapter then presents a review of the existing attentional bias research in the field of body image and eating disorders, highlighting the inconsistencies and contradictions in findings. This is followed by a discussion of some of the potential reasons underlying these differing results, including differences in the component of attention measured and the type of stimulus (images versus words) used. A spatial cuing paradigm, assessing Inhibition of Return (IOR), that is frequently used to measure one component of attention (i.e., attentional maintenance), is then described. The current research program aims to explore the inconsistent results in the literature in part through employing an IOR paradigm, as many of the current studies using the visual-probe task may have variously tapped into earlier and/or later stages of attentional processing, thereby yielding different findings across studies. Finally, the chapter concludes with a description of the experimental studies in the current research program designed to help further understand some of these inconsistent results. These three studies are outlined further below.

Two possible factors contributing to the inconsistent findings in attentional biases for body-related stimuli are the use of attentional tasks that do not clearly distinguish between early and later stages of attention, and the individual difference variable of the importance of shape and weight for self-worth. As such, Chapter Three reports on Study One, that sought to investigate participants with varying levels of shape/weight importance. More specifically, this experimental study employed an IOR paradigm to examine attentional maintenance to non-thin and thin-ideal body images in young women ($n = 49$) with high and low levels of shape/weight-based self-worth. For the non-thin images, the Low group alone displayed increased IOR (i.e., decreased attentional maintenance) compared with the control images. For the thin-ideal images,

the Low group alone displayed a trend towards increased IOR compared with the control images. These results suggest that individuals who do not place a high importance on their shape and weight as a basis for their self-worth may have a protective (adaptive) mechanism that prevents the ongoing processing of non-thin (and possibly thin) body information from their environment. Conversely, individuals lacking this protective mechanism (i.e., those with elevated shape/weight-based self-worth) may be at risk for increased processing of body information from their environment.

As stated, another potential explanation for the different results in the existing literature may be due to the type of stimulus used, including the use of images versus words, as these stimuli may be processed differently. Study Two (described in Chapter Four) therefore sought to complement the focus on images in Study One by investigating IOR for non-thin and thin-ideal body words in young women ($n = 105$) with high and low levels of shape/weight-based self-worth. For the non-thin body words, the Low group alone displayed reduced IOR (i.e., increased attentional maintenance) compared with the control words. This ongoing awareness of the informational aspects of shape/weight verbal stimuli may be adaptive, as it encourages an awareness of the negative consequences of not engaging in healthy weight control behaviours in individuals who do not place a high importance on their shape and weight. These findings were in the opposite direction from those obtained in Study One, which, in combination, suggest that words and images may be processed differently. Alternatively, the contrasting findings for images versus words may have been a methodological artifact of the greater complexity of processing images relative to words. Either way, our findings indicate that the various use of words versus images across studies may have contributed to the inconsistent results in previous research.

Beyond the roles of levels of shape/weight-based self-worth, the stage of attention assessed, and the type of stimuli employed, situational factors may impact on altered information processing, although they have been minimally investigated. One situational factor that may be relevant for the processing of body-related stimuli is interpersonal rejection, as it is proposed to play a key role in the development and maintenance of eating disorder symptoms. As such, Chapter Five describes Study Three, which sought to investigate the role of interpersonal rejection versus acceptance in the attentional processing of body information. Young women ($n = 90$) were exposed to either acceptance or rejection through the use of a widely used ostracism paradigm (i.e., Cyberball) and then completed the IOR task with non-thin and thin-ideal body images. The results found no effect of acceptance versus rejection on IOR for body (non-thin and thin-ideal) versus control images, between those with high versus low shape/weight-based self-worth. Yet, irrespective of Cyberball condition, participants in the Low group displayed increased IOR to the non-thin body images compared to the control images, indicating an overall tendency to minimise the ongoing processing of non-thin body images (as found in Study One). There were no differences in IOR for the non-thin or thin-ideal body images and control images in the High group (again consistent with the results from Study One).

Chapter Six provides a summary of how this program of research builds upon current research, particularly in terms of understanding differences in attentional maintenance biases to body stimuli in a community sample of young women. The present results are considered in line with current cognitive theories of body image disturbance and eating disorders, with refinements and extensions to existing models discussed. Clinical implications for understanding and treating body image disturbance and eating disorders are presented, including discussion of how to extend treatment

approaches to directly work with the ability to disengage attention. Lastly, the strengths and limitations of the program of research are discussed, and a number of future directions are presented. This program of research presents novel findings in the area of IOR for body stimuli in young women, and therefore provides an empirical foundation for a fruitful area of research, including investigating the protective mechanisms exhibited by women whose self-worth is not strongly influenced by their shape/weight.

Chapter One. Body Image Disturbance and Eating Disorders

Chapter Overview

This chapter focuses on the construct of body image disturbance and its extreme manifestation in the form of eating disorders. It begins with the definitions, development, prevalence, and consequences of body image disturbance and eating disorders. The chapter then presents a summary of cognitive theoretical frameworks of body image and eating disorders, with an emphasis on the schema framework for understanding dysfunctional information processing, particularly attentional biases. Finally, this chapter concludes with a review of the potential role of interpersonal factors in triggering these attentional biases in vulnerable individuals.

Body Image Disturbance

Definition of body image and its disturbance. Body image refers to the psychological experience and mental representation of one's physical appearance (Garner & Garfinkel, 1981), including an individual's thoughts, feelings, perceptions, and behavioural responses to their body (Thompson, 1990). Thus it is commonly recognised that body image is a multidimensional construct made up of perceptual, affective, cognitive/attitudinal, and behavioural components (Cash & Pruzinsky, 2002; McCabe & Ricciardelli, 2004; Rosen, 1990; Slade, 1994).

The perceptual component of body image refers to the sensory perception of one's body, which may or may not be an accurate representation of how the individual actually looks (Gardner, 2012). The perceptual component of body image is distinct from the cognitive/affective and attitudinal components, such that an individual may have a distorted perception of their body without accompanying dissatisfaction, or alternatively individuals may be highly dissatisfied with their body but have an accurate perception of their own body. Individuals with eating disorders demonstrate a selective overestimation of their own body size compared with healthy controls (Benninghoven,

Raykowski, Solzbacher, Kunzendorf, & Jantschek, 2007). Some studies suggest that the accuracy with which individuals perceive their body is an important component in eating disorder psychopathology, as individuals who overestimate their body size display worse outcomes in treatment and higher rates of relapse (Gardner, 2012; Smeets, Smit, Panhuysen, & Ingleby, 1997). Several measures have been developed to assess an individual's body size distortion, ranging from figural drawing scales, where an individual selects the figure that is most representative of their body size, to more complex computer based assessments, where individuals adjust the width of computer images until they most accurately represent their body size (Cash, 2012; Gardner, 2012). The perceptual component of body image is important as distorted perceptions could contribute to greater dissatisfaction and preoccupation with one's own body, when an individual is highly concerned with their appearance.

The affective component refers to an individual's feelings about their body, such as subjective ratings of 'feeling fat' (Slade, 1994). These feelings are separate from actual body weight, whereby women can report feeling fat regardless of their objective body weight (Tiggemann, 1996). Subjective feelings of fatness help to predict body dissatisfaction (Tiggemann, 1996), are elevated in non-clinical populations (Ben-Tovin & Walker, 1991), and are frequently cited concerns among adolescent girls (Wertheim, Paxton, Schutz, & Muir, 1997). As a result, an individual's affective response to their real or perceived body weight has been recognised as an important component of body image.

The cognitive/attitudinal component of body image refers to an individual's thoughts and beliefs about their body. This component encompasses an individual's evaluation and investment in their body image (Cash, 2012). Body image evaluations include the positive or negative beliefs and cognitive appraisals of one's physical

appearance, and contribute to an individual's sense of satisfaction or dissatisfaction with their body (Stice & Shaw, 2002). Body dissatisfaction occurs on a spectrum from mild concern about appearance, to a level of concern that causes significant impairment in daily functioning. An individual's level of body dissatisfaction results from a discrepancy between one's 'actual' body and their ideal body size, with greater differences resulting in greater body dissatisfaction (Williamson, Gleaves, Watkins, & Schlundt, 1993).

Often the construct of body image is equated with body image evaluation or body dissatisfaction, yet the cognitive component of body image goes beyond this to also include an individual's investment in their body image. Specifically, the extent to which body dissatisfaction impacts an individual relates to the level of importance their physical appearance plays in determining their self-worth (Cash, 2012). Within eating disorders, the transdiagnostic theory proposed by Fairburn, Cooper, and Shafran (2003) posits that individuals with eating disorders have a dysfunctional system for evaluating self-worth, referred to as overvaluation of shape and weight. Specifically, while most people evaluate their self-worth in terms of their performance across a number of different domains (such as academic performance, sporting ability, and their relationships with others), individuals with eating disorders primarily or solely limit their evaluation of themselves to their shape and weight. Most other features of eating disorders are proposed to result from this overvaluation of shape and weight. That is, when shape and weight become the basis of self-evaluation, maladaptive weight control measures are pursued, such as severe dietary restraint, laxative misuse, and over-exercising as a means of establishing feelings of self-worth. This model highlights the central role of this dysfunctional system for evaluating self-worth in the maintenance of eating disorders (Fairburn, 2008).

Finally, the behavioural component of body image includes behaviours engaged in to modify one's physical appearance including maladaptive behaviours (e.g., fasting, misuse of laxatives or appetite suppressants, restricting whole food groups, excessive exercise, and self-induced vomiting) (Mintz & Betz, 1988; Rosen & Gross, 1987; Tylka, 2004). These behaviours can result in significant negative physical and psychological impairments.

In addition to body change strategies, the behavioural component of body image disturbance can entail excessive body checking and/or avoidance. Body checking includes any behaviours intended to gain information about one's size, shape, weight, and appearance (Walker & Murray, 2012), and may include frequent weighing, repeated measuring, pinching particular parts of the body, comparing one's body to others, seeking reassurance from others on their appearance, and examining one's appearance in mirrors or other reflective surfaces. Body checking is often time consuming and problematic as it maintains an individual's overconcern with their shape and weight, induces body dissatisfaction, increases dietary restraint, and contributes to negative mood (Fairburn, Shafran, & Cooper, 1999). While body checking is focused on gaining information about body parts, body avoidance is aimed at escaping information about one's size, shape, weight or appearance. For example, due to body avoidance individuals may avoid weighing themselves, wearing particular types of clothing or material, dressing and undressing in the light or in front of others, and social activities where one's appearance may be noticeable such as swimming. Body avoidance stems from significant concern with one's shape and weight, and functions to reduce the distress one feels as a result of an evaluation of their body (Heatherton & Baumeister, 1991). Individuals can switch from frequent checking to body avoidance when the checking becomes too distressing. Body avoidance functions to maintain an individual's

overconcern with their shape and weight as they do not have an opportunity to test out whether their fears or predictions about their body size and weight are accurate (Walker & Murray, 2012).

Factors contributing to body image. An individual's body image is subjective, and influenced by a number of factors including biology (such as one's weight history), personality and individual differences (e.g., low self-esteem, depressed mood, and perfectionism; Wertheim & Paxton, 2012), and social pressures linked with culturally reinforced standards of beauty (Rieves & Cash, 1996). The latter has been a particular focus of theoretical and empirical attention (Cash, 2012).

Culturally reinforced beauty standards serve to shape how people think, feel, and act in relation to their body. Sociocultural theories of body image highlight the role that beauty standards play in influencing what an individual comes to value and expect about physical attractiveness. Western culture places a significant emphasis on thinness and beauty for women, and muscularity for men, which drives beliefs around what is attractive and desirable, thereby reinforcing the belief that if one's own body does not meet these idealised standards it is inherently bad (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999b). While women experience social pressure to be thin, men are exposed to pressure to be larger and more muscular. Hence, while women are more likely to strive for thinness, men are more likely to strive for greater muscularity (Hildebrandt, Langenbucher, & Schlundt, 2004; McCreary, Hildebrandt, Heinberg, Boroughs, & Thompson, 2007). The internalisation of the thin-ideal and muscularity prevalent in Western media is one avenue that communicates the importance of physical appearance, along with interpersonal experiences with family and peers (e.g. Cash, 2012; Levine, 2012; Stice, 1994; Stice & Whitenton, 2002; Thompson et al., 1999b).

Prevalence and consequences of body image disturbance. The importance of understanding the impact of body image disturbance is emphasised by its prevalence and associated negative consequences. A large body of literature investigating the effects of body image disturbance focuses on individuals whose disturbance reaches clinical significance (e.g., those with eating disorders), yet a greater proportion of individuals who do not meet a clinical threshold still experience significant impairment and distress related to body image disturbance (Cash & Hicks, 1990). Indeed, body dissatisfaction is so common in the general population that it has been referred to as “normative” amongst women (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Rodin, Silberstein, & Striegel-Moore, 1984). Research has found that over 86% of women report dissatisfaction with their appearance (Mond et al., 2013), and that body image is in the top three concerns for children and young people (Bailey et al., 2016). Young adult women are at the greatest risk, and display the highest level of body image concerns and related eating disorder symptoms (Bucchianeri et al., 2013; Stice, 2002; Swami et al., 2010).

Even though it is now considered ‘normative’, body image concerns have a significant impact, leading to impairment in quality of life, mental health, and psychosocial functioning. Research has demonstrated strong links between negative body image, impairment in functioning, and the development of subsequent psychopathology (Cash & Grant, 1996; Cash & Labarge, 1996; Garner & Wooley, 1991). More specifically, individuals with elevated levels of body image disturbance experience greater psychosocial impairment, suicide attempts, and psychiatric disorders including anxiety and mood disorders (Thompson et al., 1999b) and low self-esteem (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006). Moreover, frequent dieting (as commonly stems from body image disturbance) is associated with poorer mental

health. For example, it has been shown that women who engage in dieting are 45% more likely to be depressed compared with individuals who do not (Kenardy, Brown, & Vogt, 2001), while other research has linked dieting with significant health risks (Lissner et al., 1991), nutritional deficiencies (Kenardy et al., 2001), and increased risk of death due to cardiovascular problems (Jeffery, 1996).

Men are also vulnerable to experiencing mental health disorders and maladaptive responses as a result of body image disturbance, including muscle dysmorphia, a psychological disorder characterised by the drive to become objectively more muscular than the average male (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Individuals with muscle dysmorphia experience high levels of shame and anxiety as well as engaging in maladaptive eating behaviours and anabolic-androgenic steroid use (Hildebrandt, Schlundt, Langenbucher, & Chung, 2006; McCabe & Ricciardelli, 2004).

Of the various types of psychopathology, the strongest links have been established between body image disturbance and eating disorders (Polivy & Herman, 2002; Stice, 2002; Stice & Shaw, 2002). For instance, body dissatisfaction is the strongest predictor for risk of onset of any eating disorder (Stice, Marti, & Durant, 2011). In addition to constituting a risk factor for eating disorders, body image disturbance features among the current diagnostic criteria for these conditions (American Psychiatric Association [APA], 2013).

Eating Disorders

Eating disorders are defined as a disturbance to eating or other behaviours with the intention to control weight, which results in clinically significant impairment of physical, psychological, and social functioning (Fairburn & Harrison, 2003; Klein & Walsh, 2004). Eating disorders are complex, poorly understood, have a high rate of mortality, and are difficult to treat (Stice, 2002). The current *Diagnostic and Statistical*

Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013) recognises four main eating disorders: anorexia nervosa, bulimia nervosa, binge eating disorder, and avoidant/restrictive food intake disorder.

Anorexia nervosa is the active pursuit of a significantly low weight through severe restriction of food intake, with an intense fear of gaining weight (APA, 2013; Fairburn & Harrison, 2003). In addition to being at a significantly low weight, individuals with anorexia nervosa display the aforementioned cognitive component of body image disturbance in the form of “undue influence of shape and weight on self-evaluation” (APA, 2013, p. 339), which is also referred to as body importance or overconcern with shape and weight.

Bulimia nervosa is characterised by recurrent binge eating episodes (i.e., an objectively large amount of food is consumed in a defined period of time, accompanied by a loss of control) together with the presence of compensatory behaviours (such as self-induced vomiting, laxative misuse, fasting, or over-exercising) in an attempt to prevent weight gain. The key feature distinguishing bulimia nervosa from anorexia nervosa is the significantly low body weight characterising the latter (APA, 2013). Similar to anorexia nervosa, the diagnosis of bulimia nervosa requires that an individual’s self-evaluation is significantly influenced by their body shape and weight (APA, 2013). Therefore, individuals with these conditions share this feature of evaluating their self-worth primarily or solely in terms of their shape and weight, which has been conceptualised as the core psychopathology of eating disorders (Fairburn et al., 2003; Fairburn & Harrison, 2003).

Binge eating disorder is characterised by repeated binge eating episodes in the absence of any compensatory behaviours. Currently the diagnostic criteria for binge eating disorder do not require that an individual displays undue influence of shape or

weight on self-evaluation. However, there has been considerable debate surrounding whether or not it should be included in the diagnostic criteria, at least as a specifier, for binge eating disorder (Goldschmidt et al., 2010; Grilo, 2013; Grilo et al., 2009; Hrabosky, Masheb, White, & Grilo, 2007; Mond, Hay, Rodgers, & Owen, 2007). Arguing for its inclusion is research demonstrating that individuals with binge eating disorder who evaluate their self-worth in terms of their shape and weight display significantly greater eating disorder symptoms, psychological impairment, and worse treatment outcomes than individuals who do not overvalue their shape and weight (Grilo et al., 2009; Harrison, Mitchison, Rieger, Rodgers, & Mond, 2016; Harrison, Mond, Rieger, & Rodgers, 2015).

Avoidant/restrictive food intake disorder (ARFID) is a more recently recognised eating disorder in the *DSM-5*, which refers to eating or feeding disturbances due to a lack of interest, avoidance based on sensory characteristics of the food (e.g., texture), or concern about potential consequences of eating (e.g., vomiting or pain), which result in a persistent failure to meet appropriate nutritional and energy needs. This is associated with significant weight loss, nutritional deficiency, dependency on enteral or oral supplements, or interferences in psychosocial functioning (APA, 2013). This condition is unique amongst the eating disorders in that body image disturbance is not a central or associated aspect and, indeed, may not even be present.

Collectively eating disorders are estimated to affect around 9% of Australian women over their lifetime (National Eating Disorder Collaboration [NEDC], 2015) and between 8.7% and 15.9% of women globally (Wade, Keski-Rahkonen, & Hudson, 2011). Moreover, they have the highest mortality rate of any mental illness (NEDC, 2015). Eating disorders are complex, and their development and maintenance is not well understood. Yet the significant impact of eating disorders on mental and physical health

(Ágh et al., 2016; Samnaliev, Noh, Sonnevile, & Austin, 2015; Treasure, 2008) highlights the importance of understanding the factors that could be related to the development and maintenance of these conditions. Body image disturbance, and specifically overvaluation of shape and weight, is a factor that has been proposed to contribute to the development and maintenance of these problems (Fairburn et al., 2003).

Schema Models of Body Image Disturbance and Eating Disorders

Central to models of body image disturbance and eating disorders is a self-schema related to appearance. Markus (1977) defined self-schemas as, “cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in the individual’s social experience” (p. 64). The attributes an individual deems to be important to their self-concept, and as such form part of their self-schema, influence what information is selectively attended to in the environment (Markus, 1977). Schemas are cognitive structures that contain rules, attitudes, assumptions, and beliefs, which organise experiences, motivate action, and guide the content of thoughts, emotions, and behaviours (Beck & Freeman, 1990).

When an individual possesses a particular schema it distorts the processing of information relevant to this domain (Beck & Clark, 1997). For example, information consistent with the schema is selectively attended to faster, encoded more deeply, and remembered with greater ease, at the cost of missing and disregarding schema-inconsistent information. The consequence of this process is that information that selectively reinforces the schema is processed whereas information challenging the schema is ignored, resulting in the maintenance of the belief systems contained in the schema (Beck & Clark, 1988).

Based on the central role of schemas in driving and maintaining various forms of psychopathology, including anxiety and depression (Beck & Clark, 1988), researchers have utilised the schema construct to help understand how biased information processing drives poor body image and, more broadly, eating disorder symptoms. Cognitive theories of body image and eating disorders emphasise the role of body shape and weight importance in the development and maintenance of these conditions. Individuals who ascribe a high level of importance to shape and weight are proposed to possess an appearance-based self-schema. Appearance self-schemas relate to the importance of physical appearance, including shape and weight, to one's identity and sense of self-worth (Cash, 2012). Those with appearance self-schemas are in turn proposed to process information pertinent to shape and weight differently than those who are aschematic in this domain. By preferentially processing information related to appearance, the schema is theorised to have a range of adverse consequences, including reinforcing the importance one places on their appearance (Cash, 2012; Vitousek & Hollon, 1990). Several theories have been proposed that highlight the role of schematic processing in the development and maintenance of body image disturbance and eating disorders (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999a; Vitousek & Hollon, 1990; Williamson et al., 2002).

Vitousek and Hollon's schema processing framework. Drawing from the work of Markus (1977) on self-schemas, Vitousek and Hollon (1990) proposed a framework to understand cognitive processing in people with eating disorders. This framework emphasises the central role that shape and weight schemas play in the aetiology and maintenance of eating disorders.

According to this framework, the close association between beliefs about shape and weight and an individual's self-concept explains, at least in part, the development

and persistence of eating disorder symptoms. Three types of schemas are theorised to be relevant to understanding eating disorders: the self-schema, weight-related schema, and weight-related self-schema (Vitousek & Hollon, 1990). The self-schema processes information related to the self, and the weight-related schema contains beliefs about weight (e.g., stereotypes associated with different weights, and cultural ideals about weight), which are not unique to individuals with eating disorders. The weight-related self-schema unites these two schemas, and processes information about the self in terms of weight. Individuals with weight-related self-schemas, such as individuals with eating disorders, are predicted to display systematic errors in attending and responding to shape and weight information in their environment. These biases in processing information regarding shape and weight serve to maintain the dysfunctional belief system in relation to one's shape and weight, and drive disordered behaviours intended to control one's weight. For instance, body information is attended to faster in the environment at the cost of missing other information, keeping concerns about their bodies' front of mind and increasing attempts to change their body shape or weight. Understanding the presence and effect of this schema on information processing has important implications for further understanding and developing cognitive models of eating disorders, and has implications for current treatments where the schema may need to be targeted more directly.

Thompson, Heinberg, Altabe, and Tantleff-Dunn's cognitive processing model. Broadly consistent with the cognitive model for eating disorders proposed by Vitousek and Hollon (1990), Thompson et al. (1999a) developed a cognitive processing model to understand body image disturbance in general rather than exclusively in eating disorders. An example of their model is shown in Figure 1.1. This model is comprised

of four main constructs, namely, the body image schema, self-representation, mental encyclopedia, and processing of social situations.

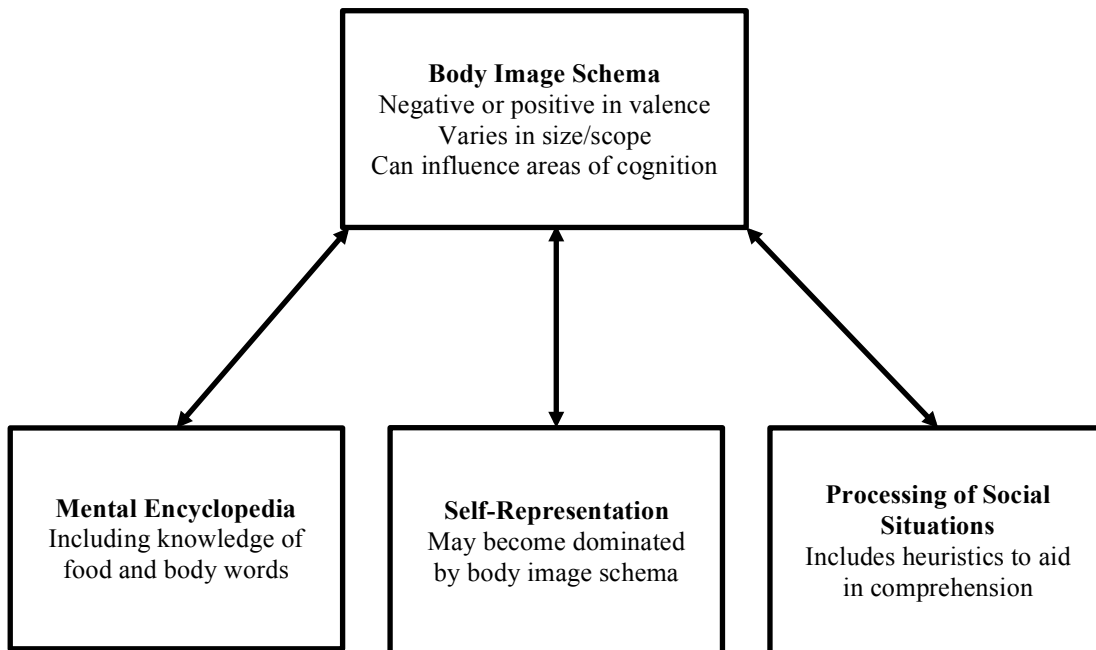


Figure 1.1. The body image schema and its relation to other areas of cognitive processing (reprinted from Thompson et al., 1999a, p.273).

Individuals possess a body image schema that contains information about one's physical self, which can be either positive or negative. Akin to Vitousek and Hollon's weight-related self-schema (1990), Thompson et al. (1999a) propose that a person's self-representation can come to be dominated by one's body image schema, which then affects information processing related to body information. The mental encyclopedia is the storage of information and knowledge in relation to food and bodies, which affects information organisation, encoding, and retrieval. Processing in social situations is related to how individuals interpret information received from others, which can serve to confirm their existing body beliefs. As a result, the body image schema can affect the processing of information in social situations such that individuals may misinterpret

information from social situations to confirm their negative view of their body (i.e. comments about looking healthy may be taken to mean looking fat), and the concepts in their mental encyclopedia, such as 'fat', take on negative connotations such as bad and lazy. As a result, the presence of a highly developed body image schema affects 'the normal input, storage, and retrieval process of the mental encyclopedia' (Thompson et al., 1999a, p. 272) resulting in a biases in processing body-related information.

Williamson, Stewart, White, and York-Crowe's information processing model. Integrating the perspectives of the above two models, the information processing model of Williamson et al. (2002) aims to understand body image as a cognitive bias which results from a body self-schema, displayed in Figure 1.2. Similar to the models described above, this schema is evident in individuals who are highly concerned with their shape and weight, and is therefore not restricted to individuals with eating disorders. This model predicts that the cognitive biases evident as a result of this schema will be of a comparable severity in individuals with eating disorders and body image disturbance.

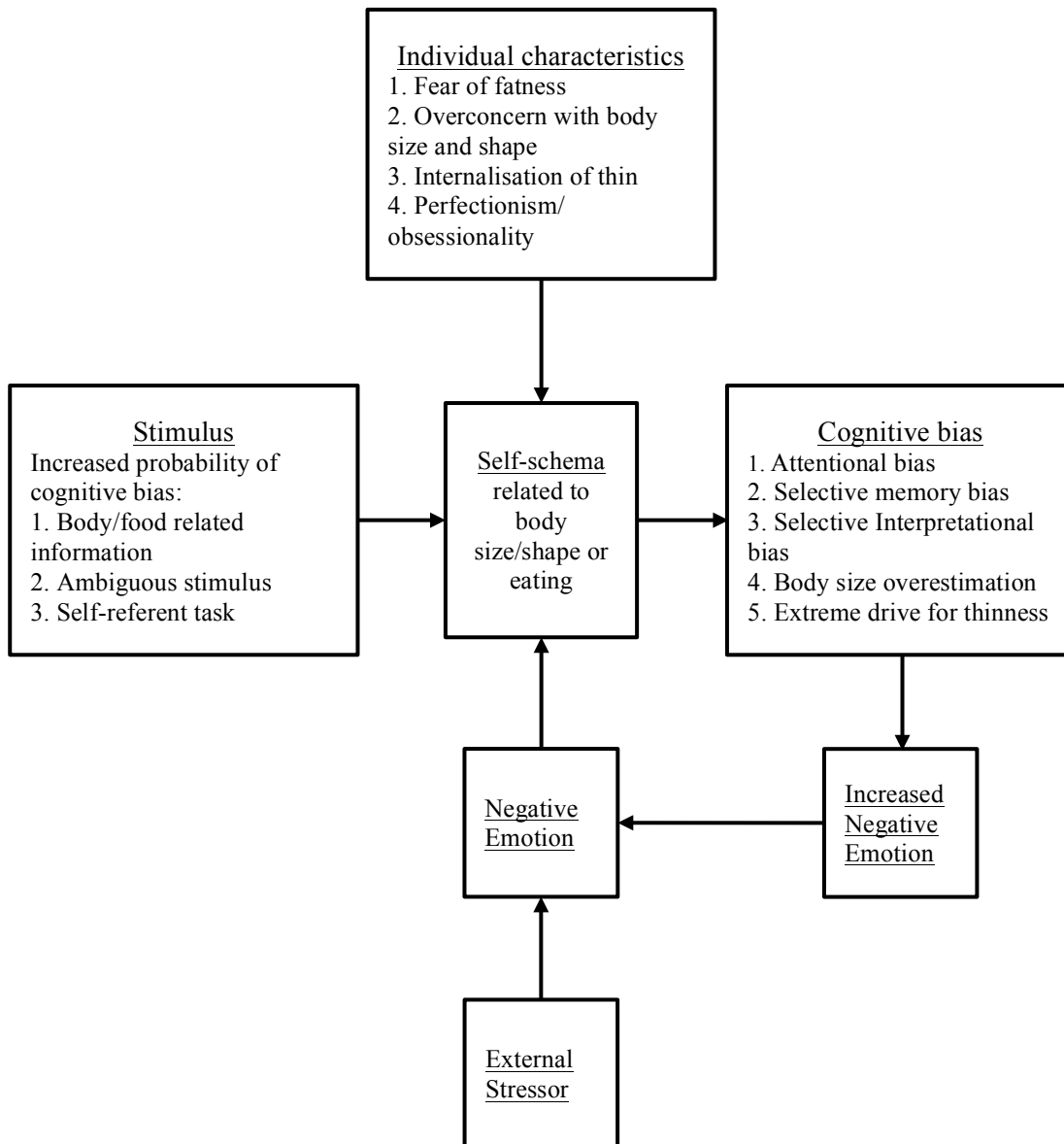


Figure 1.2. The cognitive model of body image as applied to eating disorders (reprinted from Williamson et al., 2002, p.48).

Similar to the previous models, in this model, individuals who are overconcerned with shape and weight possess a body-self schema that affects information processing of body stimuli, including effects on attention, memory, and interpretational biases. This model elaborates on the previous two models by seeking to incorporate the role of negative emotions. According to Williamson et al. (2002), information processing biases stemming from a body self-schema trigger negative

emotions, which in turn reinforce the body-self schema. For example, an individual with a highly developed body self-schema may attend more to information in the environment associated with fatness, triggering changes in mood such as increased depression, which may be experienced as a deterioration in body satisfaction. In turn, increased body dissatisfaction feeds back in to the body self-schema to strengthen the connection between negative affect and fatness related information. This model also stipulates that external stressors and self-referent stimuli can also trigger the body self-schema. One external stressor that is highly self-referent is interpersonal rejection, which has been implicated in the development and maintenance of eating disorder symptoms, and therefore may be relevant in triggering the body self-schema.

Interpersonal Models of Body Image Disturbance and Eating Disorders

A large body of research highlights an association between interpersonal problems and eating disorder psychopathology in both clinical and non-clinical populations (Arcelus, Haslam, Farrow, & Meyer, 2013). Theoretical work suggests that experiences of interpersonal rejection are implicated in the development of eating disorder symptoms in vulnerable individuals, such as those with elevated levels of shape/weight-based self-worth. Specifically, in their interpersonal model of eating disorders (IPT-ED), Rieger et al. (2010) propose that negative social evaluation, defined as “actual or perceived negative feedback regarding one’s value to another individual or group” (p. 402), triggers negative self-evaluation and associated affect. The IPT-ED model further posits that vulnerable individuals engage in eating disorder behaviours in an attempt to overcome these states of negative self-evaluation and related negative affect. According to the model, vulnerable individuals are those who base their self-worth on body shape/weight. For these individuals, challenges to self-esteem have a negative impact on body-esteem (because self- and body-esteem are interconnected),

with body dissatisfaction triggering engagement in eating disorder behaviours such as maladaptive weight control behaviours and binge eating. As such, the IPT-ED model posits that shape/weight-based self-worth moderates the relationship between interpersonal rejection and eating disorder symptoms. More specifically, the model proposes that only those individuals with elevated levels of shape/weight-based self-worth will engage in eating disorder symptoms when they are interpersonally rejected because their self-esteem is linked to their body-esteem. Conversely, individuals who do not invest their self-worth in their shape or weight will not display eating disorder symptoms when they have been interpersonally rejected, as their self-esteem is not linked with their body-esteem.

While theory and research support the role of interpersonal rejection in the development and maintenance of eating disorder symptoms, little is known about the interaction between interpersonal experience and information processing biases. In support of this, research suggests that interpersonal rejection may affect early-stage perceptual processes such as attention (DeWall, Maner, & Rouby, 2009). In the area of social anxiety, interpersonal rejection was found to modify attention towards motivationally-relevant stimuli (Tanaka & Ikegami, 2015). Of interest is whether individuals with elevated shape/weight-based self-worth systematically display attentional biases regarding body-related stimuli or whether they are triggered/exacerbated under certain circumstances, such as when experiencing interpersonal stressors. An understanding of how interpersonal factors affect the cognitive biases predicted in the cognitive models of eating disorders and body image disturbance would help to further develop these models, and thus potentially lead to more effective treatment.

Chapter Summary

This chapter described the multidimensional nature of the body image construct. One aspect of this construct pertains to overconcern with shape and weight, that is, a dysfunctional belief system whereby these aspects of appearance come to dominate the individual's evaluation of their self-worth. Various schema theories have defined this construct utilising somewhat different terminology (e.g., weight-related self-schemas and body-self schemas) but sharing the premise that these schemas result in distorted information processing that in turn drives maladaptive responses (e.g., dangerous weight control behaviours, body dissatisfaction, and negative mood), as well as keeping shape and weight central to one's self-worth. These theories suggest that people with body image disturbance and eating disorders will demonstrate dysfunctional information processing in relation to shape- and weight information, which will in turn be implicated in symptom perpetuation. While these cognitive models initially focused on the central role of this body-self schema, more recent models have included the additional constructs of negative emotion and social interactions in the expression of cognitive biases. In this, they are in accordance with models of eating disorders that ascribe a key role to interpersonal factors. Whether interpersonal stressors do indeed impact on attentional biases as theorised remains under investigated.

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Chapter Two. Attention and Attentional Biases in Body Image Disturbance and Eating Disorders

Chapter Overview

This chapter focuses on attention and attentional biases. It begins with an outline of the components of attention and the cognitive tasks commonly used to measure them. The chapter then presents a review of the existing attentional bias research in the field of body image disturbance and eating disorders. Inconsistencies in results are discussed and some potential reasons for these differing results, including the component of attention measured and the type of stimulus used, are introduced. One spatial cuing paradigm, Inhibition of Return (IOR), is then described as a way to further understand these inconsistencies. Finally, the chapter concludes with a description of the series of experimental studies comprising the current research program, which are designed to further understand the nature of attentional biases regarding body-related stimuli and resolve some of the inconsistent findings.

Definition of Attentional Bias

The human visual system is often presented with an overwhelming amount of sensory information at any given moment. Yet it has a limited processing capacity. To solve this problem, the system has developed a mechanism that can quickly and effectively select relevant information for further processing (Desimone & Duncan, 1995; Posner, 1980). Attention is the mechanism through which some information from the environment is selected, and other irrelevant information is filtered out (Kinchla, 1992; Pilsbury, 1921). The information selected for further processing through attention typically becomes the focus of an individual's thoughts, feelings, behaviours, learning, and memory, and can lead to preferential processing of future information (Pilsbury, 1921; Posner & Petersen, 1990). Hence it is not surprising that observed distortions in attentional processes have been extensively investigated by mental health researchers, including those concerned with body image disturbance and eating disorders.

Processing information from the environment involves three key operations: shifting attention towards a stimulus; engagement of attention with the stimulus; and disengagement of attention from the stimulus to enable attention to be allocated elsewhere (Posner, 1980; Posner & Petersen, 1990). Current theoretical models of attention propose that attention is biased toward information related to the individual's goals or beliefs (top-down) or due to an object's salient perceptual characteristics (bottom-up) (Desimone & Duncan, 1995). Attention can also be divided according to the catalyst for its allocation. Endogenous attention, where attention is allocated in a voluntary, top-down way, occurs when an individual's intentions, goals, or expectations direct the allocation of attention towards events, locations or objects, which aids in the individual achieving an objective (e.g., the goal of trying to find someone in a crowded room will result in attention being directed to one of their personal characteristics, such as hair colour or voice) (Ruz & Lupiáñez, 2002). Alternatively, exogenous attention, where attention is directed in an involuntary, bottom-up way, occurs when attention is drawn to objects or locations in space due to their perceptual characteristics (e.g., a loud noise drawing attention automatically towards this location) (Ruz & Lupiáñez, 2002).

Further to this, attention can be preferentially allocated (endogenous or exogenous) to specific types of information or objects, and this is known as an attentional bias. Attentional biases can be defined as a consistent difference in the allocation of attention regarding particular stimuli (Williams, Watts, MacLeod, & Mathews, 1997). Biases in attention can occur in all three aforementioned operations of attention. That is, biases in attentional capture occur when there are changes in the orienting and/or engagement of attention. For example, if there is an attentional bias in engagement toward particular stimuli, these stimuli will be detected faster than other stimuli. Alternatively, biases in disengagement of attention occur when there are

changes in how an individual shifts attention away from a stimulus (Cisler & Koster, 2010; Koster, Crombez, Verschuere, Van Damme, & Wiersema, 2006). For example, if there are biases in the disengagement of attention, such stimuli will hold attention longer than other stimuli. As attention influences an individual's thoughts, feelings, and actions, attentional biases can also affect these processes.

Several different experimental paradigms have been used to investigate and demonstrate systematic biases in an individual's attention for specific stimuli, as a function of psychopathology, including body image disturbance and eating disorders. Specifically, for more than two decades researchers have investigated the role of selective attention regarding shape and weight information in individuals with an eating disorder, or at risk of developing an eating disorder (Dobson & Dozois, 2004; Faunce, 2002; Rieger et al., 1998; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998; Shafran, Lee, Cooper, Palmer, & Fairburn, 2007). This research has regularly demonstrated biases in attention regarding shape and weight information in individuals with eating disorders and body image disturbance. Understanding the nature of attentional biases is important because they have been proposed to contribute to the development and maintenance of these disorders (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Vitousek & Hollon, 1990; Williamson, White, York-Crowe, & Stewart, 2004). The following sections will describe and review the cognitive tasks used to measure attentional biases and the evidence demonstrating attentional biases in psychopathology.

Biases in Attentional Capture

Early studies investigating attentional biases focused on differences in the capture of attention (Faunce, 2002). In the experimental context, biases in attentional capture are demonstrated when one stimulus affects the time it takes, either speeding or

slowing, to detect another stimulus (Ruz & Lupiáñez, 2002). That is, if attention is allocated to a particular location (due to attention being captured by the initial stimulus), this can improve the speed of performance by prioritising the processing of a subsequent stimulus in that location. Alternatively, if attention is allocated away from a particular location (due to the initial stimulus being avoided), this slows the detection of a different stimulus in that same location. Therefore, biases in attentional capture provide information about where attention has been allocated. Such attentional biases can be influenced by an individual's emotional or motivational state (Ruz & Lupiáñez, 2002). A number of cognitive tasks have been utilised to explore biases in attentional capture in psychopathology; two such tasks include the modified Stroop task and the visual-probe task.

Modified Stroop task. The Stroop task has been used to investigate biases in selective attention (Stroop, 1935). In the original Stroop task, a colour word (e.g., “red”) is presented in an ink colour that is either congruent (e.g., the word “red” is printed in red ink) or incongruent (e.g., the word “red” is printed in blue ink) with the word's meaning. Participants are instructed to state the ink colour whilst ignoring the content of the word. When the semantic content of the word and the ink colour are incongruent, response latencies for stating the ink colour have consistently been demonstrated to be slower (MacLeod, 1991). This is referred to as the colour-naming interference effect, and is thought to reflect attention being captured by the semantic content of the written word, thereby slowing the reading of the colour of the ink. The Stroop effect has since been modified to demonstrate differences in interference effects for motivationally-relevant words compared with neutral words; this modified version is also referred to as the modified, or emotional, Stroop task (G. S. Klein, 1964).

The modified Stroop task has been used to investigate differences in biases of attentional capture to disorder salient and neutral information in individuals with different clinical disorders, compared with healthy controls (Williams, Mathews, & MacLeod, 1996). In the modified Stroop task the semantic content of the words is manipulated to be positive, negative or neutral. Participants are instructed to read out the colour of the word while ignoring its affective meaning. Interference effects are demonstrated by longer colour-naming response latencies for emotionally relevant words (e.g., “hostile”) relative to neutral (e.g., “leaf”) or positive (e.g., “friendly”) words. These interference effects are interpreted as attentional biases in processing disorder relevant information. The assumption is that attention is selectively captured by the meaning of the emotional word (but not the positive or neutral word), which interferes with the processing of other information (i.e., the colour of the ink the word is written in). The modified Stroop task has been used to demonstrate interference effects for disorder-salient words in anxiety (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007), depression (Peckham, McHugh, & Otto, 2010), as well as other clinical populations (Mattia, Heimberg, & Hope, 1993; McNally, Amir, & Lipke, 1996). Collectively this research has demonstrated biases in attentional capture for disorder-relevant stimuli relative to neutral stimuli in individuals with that particular clinical disorder. This has spurred the use of the modified Stroop task to investigate attentional biases in individuals with body image disturbance and eating disorders.

Modified Stroop task and eating disorders. Research has demonstrated the Stroop interference effect for body shape and weight related words in individuals with eating disorders. This research demonstrated that individuals with eating disorders display increased interference effects when naming the colour of shape and weight

words, compared with neutral words, which was not observed in healthy controls (Ben-Tovim & Walker, 1991; Ben-Tovim, Walker, Fok, & Yap, 1989; Cooper & Fairburn, 1992; Dobson & Dozois, 2004; Faunce, 2002; Lee & Shafran, 2004; Sackville et al., 1998). These interference effects were interpreted to reflect attentional biases to shape and weight information, where attention is captured by the meaning of the disorder-relevant word, interfering with the processing of other information (i.e., the colour of the ink in which the word is written) (Williams et al., 1996). These initial results provided evidence that women with eating disorders demonstrate attentional biases in processing shape and weight information, which was not found in healthy controls. Despite this, there have been some differences in attentional biases for disorder-relevant information dependant on eating disorder diagnosis. For instance, while individuals with anorexia nervosa and bulimia nervosa demonstrate interference effects for food words, some research suggests that only women with bulimia nervosa demonstrate an interference effect for shape words (Ben-Tovim et al., 1989). Yet, other research reports these effects in women with anorexia nervosa only (Cooper & Todd, 1997). Further still, other research has failed to demonstrate these effects in either women with anorexia nervosa or bulimia nervosa.

Modified Stroop task in non-clinical populations. Research has also investigated the Stroop interference effect for shape and weight words in non-clinical samples of young women displaying features of eating disorders, including dietary restraint, body dissatisfaction, or a high drive for thinness (Cooper & Fairburn, 1992; Green & Rogers, 1993; Perpiñá, Hemsley, Treasure, & de Silva, 1993). However, these results are more mixed relative to research utilising clinical samples. While some research suggests a Stroop interference effect for fat-related words (Green & Rogers, 1993; Perpiñá et al., 1993), other research failed to find difference in individuals with a

high drive for thinness (Green, Elliman, Rogers, & Welch, 1997) or high levels of dietary restraint (Jansen, Huygens, & Tenney, 1998; Sackville et al., 1998) relative to healthy controls in the processing of body versus neutral words. Overall, evidence for an interference effect for shape and weight words in non-clinical samples of young women displaying features of eating disorders is inconsistent (Dobson & Dozois, 2004).

One potential reason for these inconsistent results is that the mechanisms underpinning the Stroop interference effect are unclear (Lee & Shafran, 2004). For example, Fox, Russo, Bowles, and Dutton (2001) noted that it is difficult to ascertain which attentional component emotionally-relevant words affect, suggesting that the Stroop interference effect could indeed reflect enhanced attentional capture but could also reflect other attentional processes. That is, increased colour-naming latencies could be the result of attention being drawn towards the target stimuli (i.e., shape and weight words), delayed disengagement from the target stimuli, or attention being directed away from the target stimuli. The interference effects indexed by the Stroop task are unable to differentiate between these attentional components (Cisler & Koster, 2010). As such, other cognitive tasks have been developed to further differentiate components of attentional biases; one such task is the visual-probe task.

Visual-probe task. To examine whether the colour-naming interference effects demonstrated in the modified Stroop task were due to attention being drawn towards or away from stimuli, the visual-probe task (also referred to as the dot-probe task) was developed (MacLeod, Mathews, & Tata, 1986). The visual-probe task provides a more detailed measure of attentional bias as it can differentiate between attention being preferentially directed towards or away from a particular stimulus. In the visual-probe task, pairs of stimuli (i.e., a target stimulus related to shape and weight and a control stimulus) are presented concurrently in opposite spatial locations, that is, above and

below, or left and right, of a central fixation point. Following the presentation of the stimulus pairs, a probe appears in the location previously occupied by one of the stimuli. Participants are instructed to respond to the probe as quickly as possible, by either indicating its location or differentiating between two visually distinct probes (e.g., “p” or “q”). Faster response latencies to the probe placed in the position previously occupied by the target stimulus, compared with the control stimulus, indicate an attentional bias towards the target versus control stimulus. Alternatively, slower response latencies indicate an attentional bias away from (i.e., avoidance of) the target stimulus. Thus, the dot probe task provides an index of engagement or avoidance components of attention capture (MacLeod et al., 1986). Due to the concerns raised with the use the modified Stroop task detailed above, the visual-probe paradigm has effectively taken over from this task as the paradigm used to investigate attentional biases to emotional stimuli in various clinical disorders.

The visual-probe task has been widely used to demonstrate attentional biases in clinical disorders, including substance use disorders (Bradley, Mogg, Wright, & Field, 2003; Ehrman et al., 2002), problematic gaming (van Holst et al., 2012), anxiety (Bar-Haim et al., 2007), depression (Peckham et al., 2010), and chronic pain (Schoth, Nunes, & Lioffi, 2012). This research suggests that individuals display attentional biases towards disorder salient information, and such biases have been proposed to be key maintenance factors of these disorders (MacLeod & Mathews, 1991). Given its utility, the visual-probe task was subsequently applied to study attentional biases in individuals with eating disorders.

Visual-probe task and eating disorders. Utilising the visual-probe task, Rieger et al. (1998) found that individuals with an eating disorder displayed an attentional bias away from thin body words (for example: skim, lean, skinny etc.) and a trend for an

attentional bias towards body words connoting a large physique (for example: overweight, big, chubby etc.). This specific pattern of attentional biases was not observed for non-eating disordered control participants. Utilising a pictorial version of the visual-probe task, Shafran et al. (2007) partially supported the findings of Rieger et al. (1998) showing that individuals with eating disorders displayed attentional bias towards images depicting larger physiques, including images of larger bodies and body parts such as thighs or stomachs, and pictures related to weight (e.g., scales). However, unlike Rieger et al. (1998), Shafran et al. (2007) found no attentional bias in the processing of images depicting thin physiques (although this may have been due to the images not being thin enough to capture the thin-ideal).

In contrast to studies demonstrating attentional biases regarding stimuli connoting a large physique and avoidance of those connoting a thin physique, other studies have shown the reverse (Blechert, Nickert, Psych, Caffier, & Tuschen-Caffier, 2009; Janelle, Hausenblas, Fallon, & Gardner, 2003). These conflicting findings were made transparent in a meta-analysis of visual-probe research (Aspen, Darcy, & Lock, 2013). Taken together, these studies underscore the fact that much remains to be clarified about attentional biases regarding thin and non-thin stimuli in people with eating disorders.

Visual-probe task in non-clinical populations. The problem of inconsistent findings is even more pronounced in studies utilising individuals displaying some features of eating disorders or body image disturbance, such as dietary restraint or elevated body dissatisfaction. Some research has found an attentional bias towards fat-related words (such as fat, obese, overweight etc.) in individuals with elevated levels of body dissatisfaction, which was not evident for the thin-related words (such as lean, slim, thin etc.), or in controls (Gao et al., 2011). However, other researchers reported

different of attentional biases towards thin body images in highly body dissatisfied women (Cho & Lee, 2013), or in all young women, regardless of level of body dissatisfaction and thin-ideal internalisation (Glauert, Rhodes, Fink, & Grammer, 2010). While this research could be taken to suggest an attentional bias towards all body related information, other research has reported avoidance of *all* types of body images in individuals at high risk for eating disorders (i.e., those with a high drive for thinness and body dissatisfaction) when compared with individuals at low risk (Janelle et al., 2003). Yet other research has found no differences in attentional biases to body-related stimuli between restrained and unrestrained eaters (Boon, Vogelzang, & Jansen, 2000; Rieger et al., 1998), individuals with high and low shape concern (Shafran et al., 2007), or between individuals with high and low body dissatisfaction (Placanica, Faunce, & Job, 2002). Overall, the findings reveal highly inconsistent patterns of attentional bias regarding various types of body stimuli in non-clinical populations displaying features of eating disorders.

Critique of the visual-probe task for shape and weight stimuli. The use of the visual-probe task has provided a wealth of information about attentional biases in individuals with body image disturbance and eating disorders. There are several strengths of this task: it assesses the direction of attention (i.e., whether attention is directed towards or away from a stimulus); it can incorporate images as well as word stimuli; and it investigates different stages of attention through the use of different stimulus presentation times. This task therefore provides a less ambiguous measure of attentional biases than the Stroop task.

Despite these noteworthy strengths, the current body of research using the visual-probe task includes marked inconsistencies with regards to attentional biases for shape and weight stimuli (Aspen et al., 2013). These inconsistencies may be due in part

to the visual-probe task's difficulty differentiating the components attention measured (Cisler & Koster, 2010). That is, attentional biases as measured by a visual-probe task may be assessing both facilitated attentional capture and difficulty disengaging attention (Cisler & Koster, 2010). That is, as two stimuli (one affective and one neutral) are presented simultaneously, on trials when the probe replaces the affective stimulus, faster reaction times may be due to facilitated engagement of attention, that is, increased attentional capture of the affective content of the stimuli. Alternatively, an equally plausible explanation is that these attentional biases are due to delayed disengagement of attention. When the probe replaces the neutral stimuli, slower response times may be due to delayed disengagement of attention from the affective stimuli. As a result, it is difficult to discern whether affective stimuli affect attentional engagement, disengagement, or both (Fox et al., 2001; Koster, Crombez, Verschuere, & De Houwer, 2004; Yiend, 2010). For these reasons it is important to utilise additional cognitive tasks to understand the various components of attentional biases, including the disengagement of attention.

Suggesting that dysfunction in the disengagement of attention may indeed be relevant in the eating disorder and body image disturbance context are the findings from a study by Gao and colleagues (2011) who investigated attentional biases regarding thin- and non-thin related words in individuals with high and low weight dissatisfaction through the use of eye-tracking. In eye-tracking studies, biases in attentional capture are indexed by the speed and direction of initial gaze, while maintenance biases have been indexed by gaze-duration (Garner, Mogg, & Bradley, 2006). The results of Gao et al. (2011) indicated that high weight dissatisfaction was associated with a bias towards both thin- and non-thin words, as indexed by shorter latency to first fixation, compared with control participants. In addition, their results revealed important differences in later

stages of attention. Specifically, compared to the participants with low levels of weight dissatisfaction, individuals with high levels of weight dissatisfaction had more difficulty disengaging from non-thin words, as evidenced by longer gaze duration, and increased disengagement from thin words, as indicated by shorter gaze duration. This latter result suggests that significant differences in attentional biases for body stimuli in vulnerable individuals may be occurring at later stages of attention, such as the disengagement of attention. While eye-tracking technology provides a measure of where the gaze is directed it only provides an indirect measure of what an individual has perceived. Therefore, the use of behavioural data research complements eye-tracking research by providing a further measure of what, when and how information is processed. Nevertheless, these results suggest there are significant differences in attentional biases for body stimuli in vulnerable individuals, which may be occurring at later stages of attention.

Biases in Attentional Maintenance

As previously mentioned, a key component of selective attention is sustained attention, often referred to as attentional maintenance (Posner, 1980; Posner, Inhoff, Friedrich, & Cohen, 1987; Posner & Petersen, 1990). Attentional maintenance occurs following the capture of attention, and is related to the duration of attention towards a stimulus (Nijs, Muris, Euser, & Franken, 2010). Stimuli that hold attention prevent attention from being disengaged and allocated elsewhere (Cisler & Koster, 2010). Therefore, difficulty disengaging of attention (difficulty removing attention from a stimulus), results in greater attentional maintenance for that stimulus. As such, stimuli that have increased attention maintenance, are proposed to have a greater impact on an individual's thoughts, feelings and behaviours, as attention is maintained on this information for longer. Research has sought to investigate if, like biases in attention

capture, biases in attentional maintenance play a role in various clinical disorders.

Through investigating disengagement of attention from disorder salient stimuli, research can provide some insight to the role of attentional maintenance biases in clinical disorders (Cisler & Koster, 2010). The following sections will firstly outline one task frequently used to measure attentional disengagement, the spatial cueing task (Fox, Russo, & Dutton, 2002; Posner, 1980), and discuss the evidence implicating biases in attentional maintenance in clinical disorders.

Spatial cueing task. Developed by Posner (1980), the spatial cuing task provides a way of measuring and ultimately understanding distinct components of attention. The task is multi-faceted and can be used to provide information about the processes facilitating attentional engagement, attentional disengagement, and Inhibition of Return (IOR); the latter two relate to attentional maintenance.

Similar to the visual-probe task, the spatial cuing task records response times to targets that appear in the location previously occupied by a stimulus or that appear in a novel location. However, unlike the visual-probe task, only one stimulus is presented on each trial. During a typical spatial cueing task, participants attend to a central fixation cross located between two peripheral placeholder boxes. On each trial a single cue is presented in one of these peripheral boxes. The peripheral cue serves to guide exogenous attention to that location (Posner & Cohen, 1984). Following the disappearance of the cue, the central fixation cross changes luminance to draw the participant's attention back to the central location. This serves to disengage attention from the cued location. Subsequently, after a specified time lapse, a test probe appears either in the cued location, or the opposite (uncued) location. Individuals are instructed to respond to the probe (target) as quickly as possible, either by indicating its location (left or right) or discriminating between two visually distinct probes ("p" or "q"). On

valid trials, the probe appears in the location previously occupied by the cue. On invalid trials, the probe appears in the opposite location to the cue. The duration between the cue onset and the target onset is known as the Stimulus Onset Asynchrony (SOA).

The typical findings from the spatial cuing task are as follows: 1) at shorter SOAs (less than 300ms), reaction times for the valid trials are significantly faster than reaction time for the invalid trials. This is proposed to reflect facilitation; attention has already been allocated to that location and therefore subsequent processing of the probe in that same location is improved (faster) (Posner, Snyder, & Davidson, 1980). For invalid trials, attention has been disengaged from the cued location and shifted to the uncued location, resulting in slower reaction times. Attentional biases are inferred when responses to targets that replace one type of stimulus are faster than responses to targets that replace the control stimulus. 2) As the time delay between the cue and the target increases, such as SOAs greater than approximately 300ms, a different pattern of results emerges. Now, reaction times for invalid trials become faster than reaction times for valid trials (Posner & Cohen, 1984). This is thought to be due to attention being disengaged from the cued location and inhibited from returning (Posner & Cohen, 1984; Samuel & Kat, 2003), which results in slower reaction times for the cued, compared with uncued, location. Thus at longer SOAs, the spatial cuing task measures the disengagement of attention, through Inhibition of Return (IOR).

Inhibition of Return (IOR) reflects an operation of the visual system that encourages attention to be directed to new information in the environment, by inhibiting attention from returning to previously attended locations (Posner & Cohen, 1984). IOR occurs following the engagement and subsequent disengagement of attention from a stimulus (R. M. Klein, 2000; Posner & Cohen, 1984). In practice, encouraging attention to new locations likely increases the efficiency of foraging and visual search behaviours

(R. M. Klein, 2000). For example, when searching for ripe fruit in a tree it is efficient and advantageous to mark places on the tree that have been attended to and where no food has been found, so that these may be avoided for the remainder of the search. Thus IOR is a bias against returning attention to previously attended locations; conversely, a reduction in IOR reflects difficulty disengaging attention from particular stimuli. The IOR effect is robust (R. M. Klein, 2000), has been shown to occur for both locations and objects (Jordan & Tipper, 1998), and is widely used in the investigation of attentional disengagement (Lupiañez, Klein, & Bartolomeo, 2006). The following sections present research investigating differences in IOR related different forms of psychopathology.

Inhibition of Return and psychopathology. The spatial cueing task has been used to investigate selective differences in IOR in different clinical populations. Through manipulating the affective or motivational valence of the cues to make them disorder relevant, the spatial cuing task can provide a measure of whether there are differences in disengagement of attention dependent on the content of the cue in different clinical disorders. Attentional biases to disorder relevant stimulus are investigated by comparing reaction times to targets following motivationally/emotionally relevant cues compared to control cues. Through comparing reaction times between the valid and invalid, for different stimulus types (e.g., disorder relevant and neutral cues), this task provides a measure of differences in attentional disengagement depending on the content and disorder relevance of the preceding cue. As such, IOR provides a way of investigating differences in the disengagement of attention from different stimuli, whereby, IOR is evidenced by faster reaction times on invalid trials compared with valid trials, while reduced IOR reflects reduced disengagement of attention from a particular stimulus. As such, this task is also referred

to as the IOR task. The research presented in this chapter uses different presentation times, or SOAs, depending on the research question and research design. When discussing the results of these studies and IOR, what is important is the pattern of results, that is, when the reaction time for the valid trial is longer than the invalid trial, as this reflects IOR. As such, the SOAs vary but the pattern of results is what is highlighted.

Inhibition of Return has been studied extensively in the context of anxiety. This research suggests that individuals with elevated anxiety display reduced IOR (i.e., reduced disengagement of attention) for disorder relevant stimuli (Fox et al., 2002; Pérez-Dueñas, Acosta, & Lupiáñez, 2009; Verkuil, Brosschot, Putman, & Thayer, 2009). In a study by Fox et al. (2001), participants with high trait anxiety displayed less IOR (or reduced disengagement) from threatening stimuli, a pattern not found for neutral or positive stimuli, or in participants with low trait anxiety. Building on these results, Yiend and Mathews (2001) also found that high trait anxiety participants demonstrated less IOR for highly threatening images (i.e., human mutilations, attack scenes, and dangerous animals) compared with non-threatening images (i.e., landscapes). There was no difference in IOR for these images in low trait anxiety individuals. These findings were further supported by Pérez-Dueñas et al. (2009) who demonstrated reduced IOR for negative words compared with neutral or positive words in their high trait anxiety group. Additionally, Verkuil et al. (2009) demonstrated reduced IOR for angry faces in participants with high trait anxiety and worry. Collectively, this research indicates that individuals with high anxiety display a specific difficulty in disengaging attention from threat.

Replicating this finding, Waters, Nitz, Craske, and Johnson (2007) found that participants with high levels of anxiety demonstrated reduced IOR for aversive cues

(such as mutilations, physical attacks and vicious animals) compared with positive (such as babies, couples, and food images) or neutral cues (such as household appliances or furniture). Extending previous findings, this research also demonstrated that participants with low levels of anxiety (thought to reflect a healthy control group) displayed increased IOR for the threatening cues compared with positive or neutral cues, indicating that for these individuals attention was directed away from the threatening stimuli. Increased IOR reflects increased disengagement of attention and was thus interpreted as being an adaptive emotion regulation strategy, whereby ongoing attentional allocation towards unpleasant material was inhibited. Sagliano, Trojano, Amoriello, Migliozi, and D'Olimpio (2014) also found that participants with low anxiety displayed increased IOR from threatening information.

Collectively, this research demonstrates distinct patterns of IOR for disorder salient information depending on level of anxiety. The reduced IOR towards threatening information found in individuals with high anxiety indicates that these individuals return their attention to threatening information more so than to non-threatening information, suggesting a specific difficulty disengaging their attention from threat. This body of research also demonstrated increased IOR for threatening information in the healthy control groups, which would provide an adaptive emotion regulation strategy due to minimising excessive exposure to threatening information.

In addition to anxiety, research has also investigated IOR for negative information in dysphoria and depression. For instance, Koster, De Raedt, Goeleven, Franck, and Crombez (2005) found reduced IOR for negative (such as failure, weak, lonely), compared with neutral (such as crane, screen, paper) and positive (such as beloved, skillful, powerful) words, in participants with dysphoric mood, which was not evident in those with normal mood. A similar study, using faces instead of words, by

Dai and Feng (2009) found reduced IOR for negative compared with neutral and positive faces in individuals currently diagnosed with major depressive disorder. This pattern of reduced IOR for the negative faces was not found in individuals who had experienced a depressive episode in the previous two years but were currently remitted, or in individuals who had never experienced depression. The authors suggested that reduced IOR may be related to the maintenance of depression, rather than being a stable factor.

In summary, research utilising the spatial cuing paradigm to investigate disengagement of attention has provided valuable contributions in understanding attentional biases in anxiety and depression, and suggests that individuals with these clinical disorders have reduced IOR for disorder-relevant information. Despite its focus on attentional disengagement, use of the spatial cuing paradigm in the eating disorder and body image context is limited.

Inhibition of Return and eating and weight disorders. In one of the few studies investigating attentional disengagement using a spatial cuing task in relation to eating and weight disorders, Carters, Rieger, and Bell (2015) investigated IOR for high calorie food pictures among women in the obese and normal weight ranges. They found that women with obesity displayed reduced IOR (i.e., difficulty disengaging attention) for the high calorie food images, which was not observed in women in the normal-weight category. Conversely, there were no differences between the groups in IOR from the non-food control images, suggesting that the difference in IOR observed for the obese group was specific to food-related stimuli.

Using the spatial cuing paradigm, Schmitz, Naumann, Trentowska, and Svaldi (2014) investigated differences in attentional disengagement from food cues in binge eating disorder. Their results found an attentional engagement bias, and a trend towards

difficulty disengaging attention, for food cues in participants with binge eating disorder but not for the weight matched control group. Thus this research indicated that in addition to biases in earlier stages of attention (i.e., attentional engagement), eating pathology may also be related to biases in later stages of attention, including the disengagement of attention.

Employing the spatial cuing paradigm, Gao et al. (2013) investigated differences in IOR for thin and non-thin body pictures in a sample of young Chinese women with varying levels of weight dissatisfaction. Overall, their results revealed that weight dissatisfaction was generally associated with reduced IOR (i.e., greater difficulty disengaging attention) from both thin and non-thin body images compared with neutral images. These results were consistent with their aforementioned previous findings using visual probe and eye-tracking tasks (Gao et al., 2011), which demonstrated that highly weight dissatisfied individuals displayed an attentional bias in orienting and maintaining attention toward non-thin-related words, and an initial orienting bias followed by attentional avoidance of thin-related words. These studies have made an important contribution to the field, and highlight the utility of the spatial cuing task in investigating biases in attentional disengagement.

Summary of research on the spatial cueing task. The existing body of research utilising the spatial cueing task in clinical populations has demonstrated that differences in the disengagement of attention from disorder salient information is related to different forms of psychopathology. A significant strength of this task is its ability to measure multiple aspects of attentional processing, including disengagement of attention. Given the proposed role of biases in attentional disengagement in the aetiology and maintenance of anxiety disorders (Amir, Elias, Klumpp, & Przeworski, 2003; Fox et al., 2001; Ouimet, Gawronski, & Dozois, 2009), it seems plausible that

difficulties with attentional disengagement are similarly a cognitive vulnerability in individuals with body image disturbance and eating disorders.

Differences in Attentional Biases to Images Versus Words

In addition to variations in the component of attention being measured, another potential reason for the inconsistent findings in attentional biases regarding body-related stimuli relates to the type of stimuli used. One such example relates to whether words or images are employed as stimuli. While words have been predominantly used in the modified Stroop task and early visual-probe tasks, images are now more frequently utilised in the visual-probe and spatial-cuing tasks. As a result, there are some potential challenges comparing the results across studies utilising different types of stimuli. This point is especially pertinent in the attentional disengagement literature, where the time course describing the appearance and maturation of IOR varies with the complexity of the stimuli used in the spatial cueing task (R. M. Klein, 2000).

The question of whether words or images (as two frequently used but different stimulus types) produce differing results in attentional tasks in individuals with body image disturbance or eating disorders has not been investigated to date. Yet there is research to suggest that there are indeed differences in the processing of pictorial and verbal stimuli, at least in pain-related (Dear, Sharpe, Nicholas, & Refshauge, 2011) and food cues (Freijy, Mullan, & Sharpe, 2014) in the visual-probe task. For example, one study found that while attention was directed towards low-calorie food words and away from high-calorie food words, the results for images demonstrated the reverse pattern of results (Freijy et al., 2014). One possible reason for differences between words and pictorial stimuli may be related to picture cues being closer approximations to real-world cues, and as such more ecologically valid. Further, it has been shown that pictures elicit more of an affective response than words, and therefore may be processed in

different systems (DeHouwer & Hermans, 1994). Pictorial stimuli are proposed to access a semantic system where affective information is stored, while words access a lexical system (Glaser & Glaser 1989). If words and pictures are processed by different systems, then differences in attentional biases towards different stimulus type could be expected. Research by DeHouwer and Hermans (1994) supported this prediction, and demonstrated that pictorial cues access a semantic network containing affective information, which was not accessed by words. These results indicate different patterns of attentional biases dependent on the stimulus type used. These results indicate different patterns of attentional biases dependent on the stimulus type used but this has not been tested in the context of body shape and weight related cues.

Aims and Hypotheses of the Current Research Program

The present research program is designed to contribute to the literature investigating attentional biases to disorder salient stimuli in individuals with body image disturbance and eating disorders. More specifically, the current program expands upon the existing body of research on attentional biases by investigating IOR to body related stimuli in individuals with varying levels of overconcern with shape and weight (henceforth referred to as shape/weight-based self-worth), a key component of body image disturbance and the core cognitive psychopathology of eating disorders. This aim will be addressed in a series of three experimental studies. The specific aims and studies comprising this program of research are outlined below.

Study One (Chapter Three) Inhibition of Return regarding body images in young women with shape/weight-based self-worth. The spatial cueing task has been previously employed to investigate differences in IOR for disorder-relevant information in various clinical populations. Yet to date, there has been relatively little research investigating IOR for body information in individuals with elevated body image

disturbance and disordered eating behaviours. Therefore, Study One aims to investigate IOR regarding thin-ideal and non-thin body images in individuals with high and low levels of shape/weight-based self-worth. Based on the previously outlined cognitive models of body image disturbance and eating disorders (Chapter One), it is hypothesised that individuals with elevated shape/weight-based self-worth will display differences in IOR for body images compared with neutral images.

Study Two (Chapter Four): Inhibition of Return regards body words in young women with shape/weight-based self-worth. Having investigated differences in IOR for body images, the second study sets out to use a spatial cueing task to investigate IOR to thin-ideal and non-thin body words in individuals with high and low levels of shape/weight-based self-worth. It is hypothesised that individuals with elevated levels of shape/weight-based self-worth would display differences in IOR for the body words compared with neutral words, which will not be evident in individuals without shape/weight-based self-worth. By comparing, Studies One and Two the research program aims to provide information as to whether type of stimulus (i.e., image versus word) might have different impacts on attentional bias. This comparison may also provide some explanation for the conflicting findings in this area of research.

Study Three (Chapter Five): The impact of interpersonal rejection and body shape/weight-based self-worth on Inhibition of Return regarding body images. Having investigated IOR for body images in Study One and body words in Study Two, the primary purpose of the third study is to investigate whether attentional biases are affected by interpersonal factors. As outlined in Chapter One, the cognitive and interpersonal models of body image disturbance and eating disorders implicate the role of interpersonal interactions in the development and maintenance of attentional biases. Therefore, Study Three seeks to examine whether an interpersonal rejection

paradigm can be used to modify attentional disengagement from thin-ideal and non-thin body images in individuals with high and low levels of shape/weight-based self-worth. Based on the aforementioned models, it is hypothesised that following an experience of interpersonal rejection, individuals with elevated shape/weight-based self-worth will demonstrate differences in IOR for the body images compared with the neutral images, and that these differences will not be evident in the group without shape/weight-based self-worth.

Overall, then, this research program aims to further clarify the nature of attentional biases regarding body-related stimuli by investigating the individual factors (i.e., level of shape/weight-based self-worth), component of attention (i.e., attentional disengagement versus attentional capture), stimulus factors (i.e., words versus images), and situational factors (i.e., interpersonal rejection versus acceptance) that may impact on these attentional biases. In further clarifying the nature of these biases, the present research has theoretical and clinical implications for the area of body image disturbance and eating disorders. More specified theoretical models of information processing enabled by research of this kind helps to improve prevention and treatment programs for the highly prevalent and impairing conditions of body image disturbance and eating disorders.

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**Chapter Three. Study One: Inhibition of Return Regarding Body
Images in Women with Shape/Weight-Based Self-Worth**

Inhibition of Return Regarding Body Images in Women with Shape/Weight-Based Self-Worth

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Abstract

The present study examined attentional biases to female body images in young adult (17-30 year-old) Caucasian females with high versus low levels of shape/weight-based self-worth. Using an inhibition of return (IOR) task we measured how readily participants were able to disengage attention from non-thin and thin-ideal body images. In response to non-thin body images, the Low group (i.e., participants with low levels of shape/weight-based self-worth) displayed increased IOR towards the body images relative to the High group (i.e., participants with elevated shape/weight-based self-worth). Our results suggest that women with low levels of shape/weight-based self-worth possess a potential protective mechanism that allows them to more readily disengage attention from non-thin images compared to women who base their self-worth on shape/weight. These findings provide a new focus for investigating attentional processes in individuals at risk of eating disorders, as they relate to the ongoing processing of body-related imagery beyond initial attentional capture.

Keywords: Attentional Bias, Inhibition of Return, Disengagement, Body Images, Shape and Weight Concerns

Eating disorders are defined as a disturbance of eating and other behaviours with the intention to control weight, resulting in clinically significant impairment of physical, psychological, and social functioning (Fairburn & Harrison, 2003; D. A. Klein & Walsh, 2004). They are complex, poorly understood, have a high rate of mortality, and are difficult to treat (Stice, 2002). The diagnostic criteria for both anorexia nervosa and bulimia nervosa require that individuals display an undue influence of shape and weight on self-evaluation (American Psychiatric Association, 2013; Fairburn & Harrison, 2003), which has been conceptualised as the core psychopathology of eating disorders (Fairburn, Cooper, & Shafran, 2003; Fairburn & Harrison, 2003). In contrast to individuals without eating disorders who assess their self-worth across a number of different domains, such as work, family, relationships, and sport, individuals with eating disorders judge their self-worth largely, if not entirely, in terms of their weight and shape (Fairburn et al., 2003). Most other features of eating disorders, such as starvation and compensatory behaviours, are proposed to stem from this shape/weight-based self-worth. When shape and weight become a basis for self-worth, dietary restraint, thinness, and weight loss are actively pursued (Fairburn et al., 2003). Self-worth unduly influenced by an individual's shape and weight has also been implicated in the high rate of relapse from eating disorders (Fairburn & Harrison, 2003).

Thus cognitive models of eating disorders propose that eating disorder symptoms are maintained through characteristic beliefs about the meaning of shape and weight for self-worth (Fairburn & Harrison, 2003; Vitousek & Hollon, 1990). Specifically, cognitive models of eating disorders propose that this over-evaluation of shape/weight comprises a maladaptive schema that unites beliefs about self-worth and ideas about shape and weight. A schema is a cognitive structure that develops from past experience and influences an individual's interpretation of experiences through its

influence on information processing (Vitousek & Hollon, 1990). Schemas produce systematic errors in attention, memory, perseverance, and confirmatory bias when processing information relevant to that schema (Vitousek & Hollon, 1990). As a result, the shape/weight-based self-worth schema is proposed to maintain eating disorder behaviours, and be maintained by, systematic errors in the processing of information related to shape and weight (Vitousek & Hollon, 1990). As such, cognitive models predict that individuals with shape/weight-based self-worth, whether or not it has resulted in an eating disorder, will demonstrate systematic biases in attention regarding shape and weight information in their environment (Cooper, 1997; Faunce, 2002; Vitousek & Hollon, 1990).

Researchers have investigated the role of selective attention towards shape/weight information in eating disorders for approximately 20 years (Dobson & Dozois, 2004; Faunce, 2002; Rieger et al., 1998; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998; Shafran, Lee, Cooper, Palmer, & Fairburn, 2007). Consistent with cognitive models, this research has demonstrated that individuals with eating disorders display biases in attention in the processing of shape and weight information.

Selective attention was first investigated through the use of the modified Stroop colour-naming paradigm (Lee & Shafran, 2004). This research demonstrated biases in processing interference for food, body shape, and weight related words in individuals with eating disorders (Ben-Tovim & Walker, 1991; Ben-Tovim, Walker, Fok, & Yap, 1989; Cooper & Fairburn, 1992; Dobson & Dozois, 2004; Faunce, 2002; Lee & Shafran, 2004; Sackville et al., 1998). Overall, the results and associated effect sizes suggest that women with eating disorders demonstrate a moderate degree of preferential processing of shape/weight words. Non-eating disordered controls have been found to

demonstrate a small degree of preferential processing for shape/weight words, with no difference between those with high levels of dietary restraint and healthy controls.

Using a modified dot probe task, Rieger et al. (1998) investigated biases in attentional capture in individuals with eating disorders. It was found that, unlike non-eating disordered participants (including those high in dietary restraint), individuals with eating disorders displayed an attentional bias towards body words connoting a large physique (although this finding only demonstrated a trend towards significance) and away from body words connoting thinness. Shafran et al. (2007) partially replicated these findings using photographs rather than words. They found that participants with eating disorders displayed increased attention towards images depicting larger physiques, including images of larger bodies or body parts such as thighs or stomachs. Participants with eating disorders also displayed a significant attentional bias towards weight stimuli, which included images of scales, people being weighed, or people weighing themselves. However, a meta-analysis of dot-probe research highlights inconsistencies in results investigating attentional biases regarding stimuli connoting thin versus larger physiques between individuals with eating disorders and healthy controls (Aspen, Darcy, & Lock, 2013).

The findings are also contradictory in research using an eye-tracking paradigm (Blechert, Nickert, Psych, Caffier, & Tuschen-Caffier, 2009; Janelle, Hausenblas, Fallon, & Gardner, 2003). One such study found that individuals with high levels of body dissatisfaction displayed an attentional bias towards thin body images (Cho & Lee, 2013). Consistent with this research, Blechert et al. (2009) report that individuals with bulimia nervosa fixated longer on images of women with lower BMIs than on images of women with higher BMIs. This attentional preference for images with lower BMIs was not observed in the healthy control group. Yet other research using eye-

tracking suggests individuals at high risk of eating disorders (i.e., those with a high drive for thinness and body dissatisfaction) display avoidance of all types of body images when compared with individuals at low risk (Janelle et al., 2003).

In attempting to account for the mixed findings in their systematic review, Rodgers and DuBois (2016) propose that differences in attentional biases are observed depending on the type of stimulus used (e.g., stimuli referring to the self or other) as well as the type of cognitive task employed. Regarding the latter, different cognitive tasks measure different stages of attention (Cisler & Koster, 2010). Attentional biases may be due to facilitated attention, difficulty disengaging, or attentional avoidance. It has been proposed that the attentional biases as measured by a dot-probe task may be assessing both facilitated attention and difficulty disengaging attention depending on the presentation times used (Cisler & Koster, 2010). One experimental method that can be employed to overcome this difficulty is to utilise a spatial cueing task which specifically measures just the disengagement of attention or attentional maintenance (Cisler & Olatunji, 2010).

Early studies investigating attentional biases in eating disorders primarily measured the capture of attention (Faunce, 2002). While attentional capture provides information about where attention is being oriented, attentional maintenance provides information about what is holding attention and preventing attention from being allocated to another stimulus (Gao et al., 2013; R. M. Klein, 2000). Through investigating attentional maintenance it is possible to ascertain if individuals display a difficulty in switching attention between stimuli (Cisler & Koster, 2010). Attentional maintenance is proposed to play a significant role in the aetiology and maintenance of anxiety disorders (Cisler & Koster, 2010). Therefore, an understanding of the attentional maintenance towards shape/weight information may provide further

information about the role of these attentional biases in the development and maintenance of the core psychopathology of eating disorders.

There has been limited research into the later stages of attentional processing of shape/weight stimuli. In one such study using an eye-tracking paradigm, Gao et al. (2014) found that women with elevated body dissatisfaction displayed increased sustained attention towards both thin and larger body images, when compared with women with low body dissatisfaction. While the eye-tracking paradigm provides a good measure of where attention is being directed, through eye gaze and fixture, it has limited ability to assess what is being perceived, or how saliently, quickly or effectively it is perceived. Thus without a performance metric such as reaction time, the eye-tracking task only provides an indirect measure of what an individual has perceived. Therefore, the use of behavioural data complements eye-tracking research by providing a further measure of what, when, and how information is processed. Nevertheless, the eye-tracking results do suggest disturbances in attentional maintenance regarding body-related information in vulnerable individuals.

A difficulty disengaging attention from shape and weight information would lead to an individual being continuously reminded of this information, and reduce their cognitive capacity to attend to other more adaptive information. For individuals with the core psychopathology of eating disorders (i.e., shape/weight-based self-worth), this could contribute to an ongoing preoccupation with this information, thereby increasing their vulnerability towards developing eating disorder symptoms. One spatial-cueing paradigm used to investigate the disengagement of attention is the Inhibition of Return paradigm (IOR; R. M. Klein, 2000).

Inhibition of return (IOR) is a mechanism of the visual system that encourages attending to novel information in the environment, through inhibiting attention from

returning to previously attended locations (Posner & Cohen, 1984). As such, the IOR paradigm provides a means of investigating whether individuals with high shape/weight-based self-worth have a reduced ability to disengage attention from shape/weight information. As displayed in Figure 3.1., the IOR task involves the presentation of a central fixation cross, followed by a peripheral cue, presented to the left or right, then the reappearance of the fixation cross, and finally the presentation of a target in the location previously occupied by the cue (valid trial) or the opposite location (invalid trial). The duration between the cue onset and the target onset is known as the Stimulus Onset Asynchrony (SOA). At shorter SOAs, facilitation, or attentional cueing occurs, where reaction times on the valid trial are faster than the invalid trial. At longer SOAs, IOR is present when there is a slower reaction time for valid compared to invalid trials. The IOR effect is robust (R. M. Klein, 2000) and is widely used in the investigation of attentional maintenance (Lupiáñez, Klein, & Bartolomeo, 2006). The IOR paradigm provides a way to investigate differences in disengagement of attention to different stimuli, with lower IOR reflecting reduced disengagement and greater attentional maintenance regarding that stimulus.

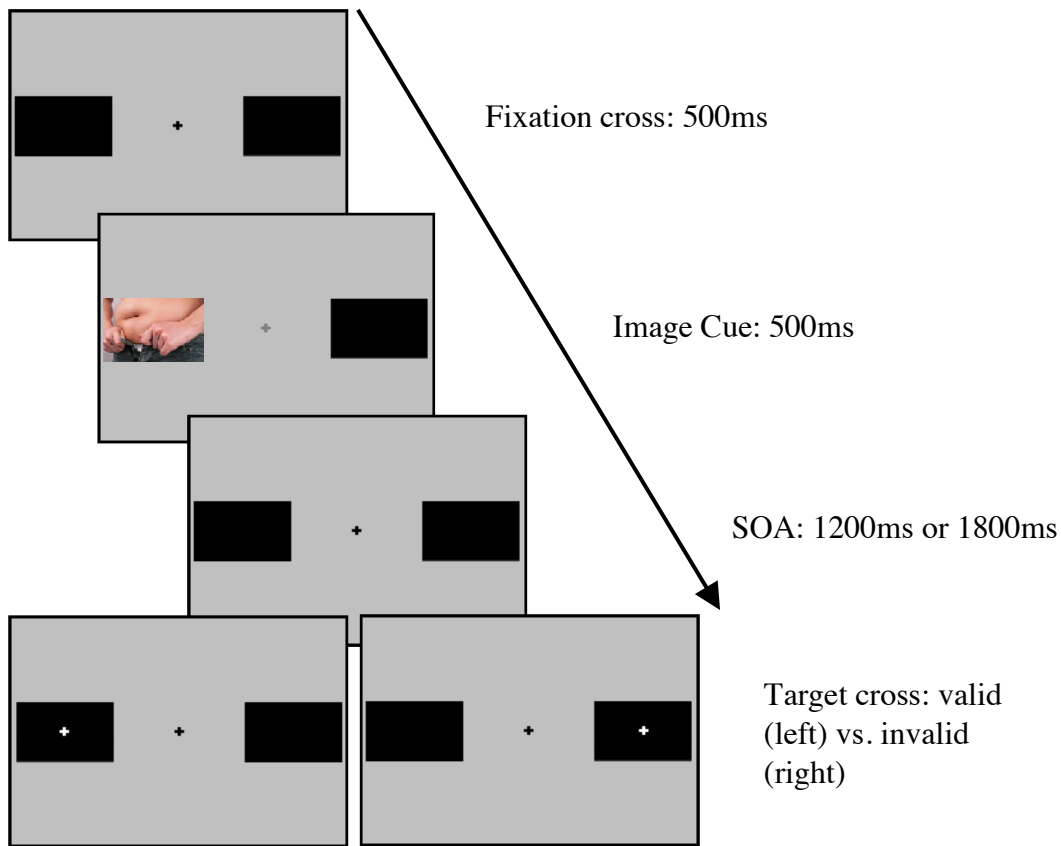


Figure 3.1. Example of the IOR paradigm trial sequence used in Study One with an example of a non-thin body image.

The IOR paradigm has been used to demonstrate selective deficits in attentional disengagement in various types of psychopathology. For instance, individuals with elevated anxiety have been shown to display reduced IOR towards threatening stimuli, including angry faces and negative words (Fox, Russo, & Dutton, 2002; Pérez-Dueñas, Acosta, & Lupiáñez, 2009; Verkuil, Brosschot, Putman, & Thayer, 2009). Similarly, reduced IOR towards negative stimuli has been demonstrated in individuals with depression (Dai & Feng, 2009). In the area of eating and weight disorders, research using the IOR has found that women with obesity display greater difficulty disengaging attention from food images than normal-weighted females (Carters, Rieger, & Bell, 2015). Another study using the IOR has suggested that individuals with elevated body

dissatisfaction display selective difficulty disengaging attention from body pictures (Gao et al., 2013). This initial body of research suggests that different forms of pathology are associated with difficulties disengaging attention from disorder-relevant stimuli. The current study expands upon the research by Gao et al. (2013) by investigating IOR related to the core psychopathology of eating disorders (i.e., shape/weight-based self-worth), instead of body dissatisfaction, which is elevated in the general female population (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013).

The aim of the current study is to utilise the IOR task to examine biases in disengaging attention from shape and weight information (both thin-ideal and non-thin body images) in individuals with elevated shape/weight-based self-worth. Based on cognitive theories of eating disorders and previous research, it is hypothesised that individuals with high shape/weight-based self-worth (the High group) will display differences in disengaging attention compared to individuals with low levels of shape/weight-based self-worth (the Low group), when exposed to non-thin and thin-ideal body images. The predicted direction of these differences is not clear given the current inconsistencies in the research regarding processing of stimuli connoting non-thin and thin-ideal physiques.

Methods

Participants

Female participants aged 17 to 30 years were recruited via flyers distributed throughout the Australian National University. A young adult, female-only sample was recruited as body image and eating disorder symptoms are elevated in this group (Bucchianeri et al., 2013; Stice, 2002; Swami et al., 2010). A Caucasian only sample was used given that, firstly, Caucasian female body images were used in this study and,

secondly, research suggests cultural differences in the cognitive processing of body imagery (Chen & Jackson, 2005).

Several criteria were used to exclude participants from the initial sample of 57 participants. Firstly, participants' data were excluded if they had a body mass index ($BMI = kg/m^2$) in the obese weight range ($BMI \geq 30$) (World Health Organisation [WHO], 1998). Three participants were removed on this basis. This exclusion criterion was utilised due to research that has demonstrated differences in IOR for disorder-salient images between participants in the normal and obese weight ranges (Carters et al., 2015). Secondly, participants' data were excluded if they did not endorse either high or low levels of shape/weight-based self-worth based on their responses to two items from the Eating Disorder Examination Questionnaire (EDE-Q; further information about this exclusion criterion is provided below in the section on the EDE-Q). The data from four participants were excluded for this reason. Finally, a mean accuracy score of 75% or above on the IOR task was required for inclusion in the analysis, with one participant's data from the non-thin trials excluded on this basis. The mean accuracy was 98.92% ($SD = 1.28$) for the non-thin ideal images and 99.71% ($SD = 1.25$) for the thin-ideal images. In addition, the catch trials had a mean accuracy of 99.69% ($SD = 1.23$) for the non-thin ideal images and 99.90% ($SD = 0.71$) for the thin-ideal images.

The final sample consisted of 50 participants aged 17 to 23 years ($M = 19.22$, $SD = 1.34$). Participation was voluntary and informed consent was gained prior to testing. Participants received AUS\$10 or 60 minutes course credit as compensation for their participation. This study had full ethics approval from the Australian National University Human Research Ethics Committee (Protocol 2014/219).

Measures

Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994). The EDE-Q was administered primarily to categorise participants according to their reported levels of shape/weight-based self-worth. The EDE-Q is a 28-item self-report questionnaire focusing on the occurrence and frequency of eating disorder symptomatology over the past 28 days. The EDE-Q is a widely used instrument due to its sound psychometric properties (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004a, 2004b). In the current study, the Cronbach's alphas were .80, .85, .92, .85 and .96 for the Dietary Restraint, Eating Concern, Shape Concern, Weight Concern, and total EDE-Q, respectively.

Of particular interest in the present study were the two items assessing shape- and weight-based self-worth. Specifically, participants were allocated to the Low group if they scored 0-2 (*not at all to slightly*) or the High group if they scored 4-6 (*moderately to markedly*) on either of the following EDE-Q items: "Over the past 28 days, has your shape/weight influenced how you think about (judge) yourself as a person?" If participants scored 3 on both items they were not allocated to a group and their data were excluded from the final analyses. There were 26 participants in the Low group and 24 participants in the High group. These two items from the EDE-Q were selected since research shows that single item measures of shape/weight-based self-worth are comparable to longer measures such as the Shape and Weight Based Self-Esteem inventory (Geller et al., 1998; Mitsui, Yoshida, & Komaki, 2017; Tchanturia, Troop, & Katzman, 2002).

Materials

Distractor task. To minimise any carry-over effects, a distractor task was completed between the two (thin and non-thin images) IOR computer tasks. The

distractor task consisted of three short music film clips, lasting a total 187 seconds. The film clips were selected from the Dataset for Emotion Analysis, (DEAP; Koelstra et al., 2012) and had previously been rated neutral in terms of valence and arousal, additionally these clips had a non-body focus. To ensure that the participants were engaged in the distractor task, they were required to answer three short questions after the clips were completed.

Picture stimuli. Images were used as cues in the IOR task. Two separate IOR experiments were run in random order across participants. In one IOR task, 20 images depicting thin-ideal body shapes were paired with 20 animal images. Thin-ideal images were defined as images of weight-related female body parts that were slender and had little/no body fat. In the other IOR task, 20 non-thin ideal images were paired with 20 animal images. Non-thin stimuli consisted of realistic images of weight-related female body parts defined as representing BMIs in the upper normal to overweight range since the mean BMI of Australian women is 26.7 (Australian Bureau of Statistics, 2013).

Images were sourced from the Internet to reflect images women are exposed to in popular media so as to maximise ecological validity. All images were standardised to 300 pixels x 200 pixels, and were 5.4 degrees wide and 3.4 degrees in height. For each IOR task, the relevant sets of body and control images were matched on valence (positive/negative) and arousal (level of interest) to control for the effect these factors have on attentional biases (Fox et al., 2002). These matchings were based on a pilot study undertaken with 40 female participants who had a mean age of 18.3 ($SD = 1.63$). The thin-ideal body images and their paired control animal images did not significantly differ on valence ($t(38) = -1.76, p = .086$) or arousal ($t(38) = -.66, p = .510$). Similarly, there was no significant difference between the non-thin body images and their paired animal images on valence ($t(38) = -1.75, p = .088$) or arousal ($t(38) = -1.674, p = .102$).

As anticipated there was a significant difference between the thin-ideal and non-thin images on valence ($t(38) = 10.27, p < .001$), whereby the thin-ideal images were rated as significantly more positive than the non-thin images. There was no significant difference between the thin-ideal and non-thin images on arousal ($t(38) = 1.61, p = .115$).

IOR tasks. The IOR tasks were administered on a computer using MatLab R2012b and the Psychophysics toolbox software (Brainard, 1997). Separate IOR tasks, with identical designs for the non-thin and thin-ideal images, were run in accordance with previous implementations of the IOR task (Carters et al., 2015). Participants sat approximately 50cm from the monitor.

For each IOR task, the computer display was set to a mid-level grey and throughout the task black rectangle picture frames were presented three degrees to the left and right of the central fixation cross. Each trial began with the presentation of a central dark grey fixation cross for 500ms, followed by a body or animal image for 500ms, in either the left or right frame (centre of image = 3 degrees away from fixation cross). Following the image presentation the central fixation cross changed brightness to cue the participant's attention back to the centre of the screen. Following a randomly designated SOA for that trial (either 1200ms or 1800ms), a white target cross appeared in either the left or right picture frame. The target cross either appeared in the cued (same location as the image; termed a valid trial), or un-cued location (opposite location as the image; termed an invalid trial). The image and target appeared an equal number of times on each side of fixation and equally in terms of being matched or unmatched in location. Participants responded by indicating the position of the target cross using the left or right arrow keys on the computer keyboard using their dominant hand. The next trial began after a response or 2000ms.

The decision to use the SOAs of 1200 and 1800 was partly based on previous research (Carters et al., 2015). The decision was also based on an understanding of IOR data from a review by R. M. Klein (2000), which showed that IOR increases with SOA, and that IOR begins at longer SOAs when using more complex cues (e.g., pictures) than it does for simple cues (e.g., spots of light). Therefore the current study did not include shorter SOAs as they would not be expected to reliably produce IOR.

Five practice trials were followed by 200 trials, separated into two blocks of 100 trials with a minimum rest period of 5000ms between the blocks. Each IOR task contained nine conditions, body and animal image conditions (x 2) a valid and invalid location (x 2) at each SOA (x 2), and a no target condition (x 1) where no target was presented. The latter condition was included to ensure that the participant was not automatically responding in a rhythm. No target trials occurred on 20% of all trials. Each other condition was presented 20 times, in random order. The participants' reaction times and accuracy on each trial were recorded in a data file within Matlab. Each task took approximately 12 minutes.

Procedure

Following expressing interest in participating in the study, each participant was allocated to an individual testing session that lasted approximately one hour. On arrival participants read the study information sheet and provided written consent. Participants then completed the two IOR tasks, with a distractor task in between. The order of the IOR tasks was counterbalanced across participants to minimise order effects. After completing the second IOR task, the participants were administered the EDE-Q and then had their height and weight measured to calculate BMI.

Statistical Analysis

Data were analysed using SPSS, version 22. Screening revealed that one participant had missing data for the non-thin IOR trials due to a computer malfunction and one other participant had missing BMI data due to issues with the scales. Screening of the IOR task data at the individual level was undertaken via Matlab and involved excluding reaction times on correct trials less than 200ms (Gao et al., 2011; Stoyanova, Pratt, & Anderson, 2007).

IOR index scores were calculated by using the mean correct reaction time data for the valid and invalid trials. The IOR index score is calculated by subtracting the mean reaction time on invalid trials from the mean reaction time on valid trials. As a result, a positive index score indicates IOR (i.e., reluctance to return attention to the previously attended location), whereas a negative IOR index score indicates an absence of IOR (i.e., a facilitation effect for returning attention to the previously attended location thereby indexing attentional maintenance).

For the computerised IOR task, two mixed between-within subjects ANOVAs were conducted to examine whether shape/weight-based self-worth (low vs. high) influenced IOR at the two SOAs (1200ms and 1800ms) for each image set, that is, (1) thin-ideal compared to control images or (2) non-thin images compared to control images. Separate ANOVAs were conducted for thin-ideal and non-thin body images, with group (high versus low) as the between-subjects variable and picture type (body versus control image) and SOA (1200, 1800) as the within-subjects variables. Significance was assessed using an alpha level of .05 (with no adjustment for multiple comparisons to maximise power; Rothman, 1990) and effect sizes were based on Cohen (1988).

Results

Data Screening and Cleaning

Analysis of univariate outliers at the group level (High vs. Low) revealed three extreme values with standardised scores exceeding 3.29 ($p < .001$, two-tailed test).

These were on the 1200 non-thin IOR, and 1200 thin control IOR in the low group, and 1800 non-thin control IOR in the high group. The data were analysed both with and without these extreme values. These analyses revealed that all of these outliers had a significant effect on normality. As such, they were removed from further analysis.

Analysis of multivariate outliers using the Mahalanobis Distance revealed no cases ($p < .001$) that were not deemed legitimate parts of the target population. Following the exclusion of the outliers, all conditions met the assumptions of normality, as assessed by normal-weighted plots, and the Kolmogorov-Smirnov statistic. Levene's test for equality of variance indicated that homogeneity of variance was present for all analyses.

Sample Characteristics

Table 3.1 displays the descriptive data for the High and Low groups.

Independent samples t-tests revealed no significant differences for age $t(47) = 0.92, p = .361$ or BMI $t(47) = 0.33, p = .741$, between the High and Low groups. However, the High group was significantly higher than the Low group in terms of dietary restraint $t(47) = -3.14, p = .003$, eating concern $t(31.33) = -4.26, p < .001$, shape concern $t(47) = -6.96, p < .001$, weight concern $t(35.90) = -3.11, p < .001$, and global eating disorder pathology $t(37.17) = -5.81, p < .001$.

The Global EDE-Q scores of the Low group were comparable to other normative samples where women with current diagnosed eating problems were excluded (Aardoom, Dingemans, Slof Op't Landt, & Van Furth, 2012; Rø, Reas, & Stedal, 2015). Additionally, the mean Global EDE-Q score of the High group was

above the recommended cut-off score of 2.50 to discriminate between clinical and control groups (Rø et al., 2015). Therefore, based on EDE-Q scores, the Low group was comparable to the normal population, and the High group was similar to a clinical sample.

Table 3.1.

Sample Characteristics of the Low and High Shape/Weight-Based Self-Worth Groups in Study One

Characteristics	Low ($n = 26$)	High ($n = 24$)
	Mean $\pm$ SD	Mean $\pm$ SD
Age	19.40 $\pm$ 1.44	19.04 $\pm$ 1.27
Body Mass Index (BMI)	21.23 $\pm$ 2.62	20.83 $\pm$ 5.46
Global EDE-Q Score	0.91 $\pm$ 0.74	2.61 $\pm$ 1.24
Eating Concern	0.42 $\pm$ 0.60	1.72 $\pm$ 1.36
Dietary Restraint	0.93 $\pm$ 0.95	1.99 $\pm$ 1.39
Shape Concern	1.31 $\pm$ 0.94	3.57 $\pm$ 1.31
Weight Concern	0.96 $\pm$ 0.81	3.17 $\pm$ 1.45

Note. Low = low shape/weight-based self-worth group; High = high shape/weight-based self-worth group

IOR for Non-Thin Body Images

To assess whether the High versus Low groups displayed a difference in IOR towards the non-thin stimuli compared to the control stimuli, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (image: non-thin and control image) x 2 (shape/weight-based

self-worth group: Low and High) mixed-design ANOVA on IOR index scores was conducted.

The ANOVA revealed no main effects for SOA, Wilks' Lambda = .987, $F(1, 44) = 0.57$, $p = .452$, ($\eta^2 = .013$); image, Wilks' Lambda = .930, $F(1, 44) = 3.29$, $p = .076$, ($\eta^2 = .070$); or shape/weight group, $F(1, 44) = 0.57$, $p = .454$, ($\eta^2 = .013$).

However, these main effects need to be interpreted in light of a significant two-way interaction between image type and shape/weight group, Wilks' Lambda = .862, $F(1, 44) = 7.04$, $p = .01$, ($\eta^2 = .138$), indicating that the IORs between the two groups differed across image type.

There were no significant two-way interactions between SOA and shape/weight group, Wilks' Lambda = 1.00, $F(1, 44) = 0.00$, $p = .989$, ($\eta^2 = .000$); or image and SOA Wilks' Lambda = .954, $F(1, 44) = 2.12$, $p = .153$, ($\eta^2 = .046$); and no three-way interaction between SOA, image, and shape/weight group, Wilks' Lambda = .999, $F(1, 44) = 0.03$, $p = .864$, ($\eta^2 = .001$). Figure 3.2. shows the significant interaction between image type and shape/weight group on IOR indices.

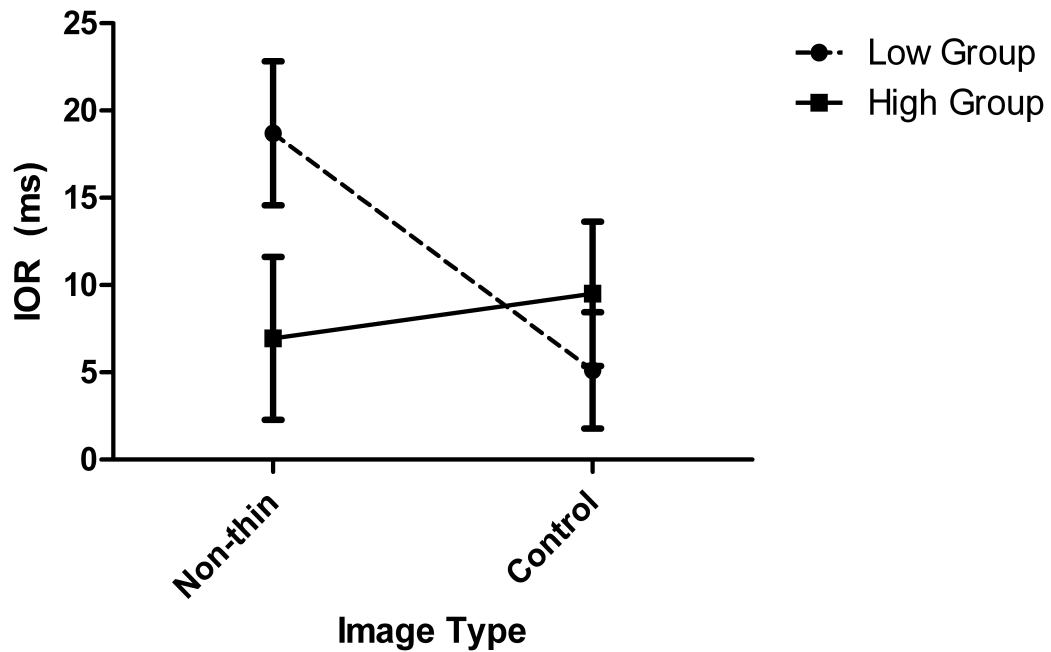


Figure 3.2. Mean IOR index scores (in milliseconds) for the non-thin and control images across the High and Low shape/weight-based self-worth groups. Error bars display +/- one standard error of the mean.

To clarify the nature of the significant interaction between group and image type, simple effects analyses were undertaken. An independent samples t-test revealed a marginally significant difference between the IOR for the non-thin body images in the Low group ($M = 18.70\text{ms}$, $SD = 20.63\text{ms}$) and the High group ($M = 6.95\text{ms}$, $SD = 21.36\text{ms}$), $t(44) = 1.89$, $p = .065$ (mean difference = 11.75, 95% CI: -0.76 to 24.25), whereby the High group displayed less IOR for the non-thin body images compared to the Low group. There was no difference in IOR for control images between the Low group ($M = 5.12\text{ms}$, $SD = 16.68\text{ms}$) and the High group ($M = 9.50\text{ms}$, $SD = 18.93\text{ms}$), $t(44) = -0.83$, $p = .414$ (mean difference = -4.38, 95% CI: -14.96 to 6.20). A paired samples t-test revealed a significant difference between the IOR for the non-thin body images versus the control images in the Low group $t(24) = 3.92$, $p < .001$ (mean

difference = 13.58, 95% CI: 6.43 to 20.73), whereby there was greater IOR towards the non-thin body images than the control images. By comparison, there was no difference between the IOR for the non-thin body images versus the control images in the High group $t(20) = -0.49, p = .629$ (mean difference = -2.55, 95% CI: -13.39 to 8.30).

IOR for Thin-Ideal Body Images

To assess whether the High and Low groups displayed differences in IOR towards the thin-ideal stimuli compared to the control stimuli, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (image: thin-ideal body image and control image) x 2 (shape/weight-based self-worth: low and high) mixed-design ANOVA on IOR index scores was conducted. This revealed no main effects for SOA, Wilks' Lambda = .999, $F(1, 46) = 0.02, p = .860, (\eta^2 = .001)$; image type, Wilks' Lambda = .998, $F(1, 46) = 0.11, p = .742, (\eta^2 = .002)$; or shape/weight group, $F(1, 46) = 0.57, p = .454, (\eta^2 = .012)$. Additionally, the two-way interactions between image type and shape/weight group, Wilks' Lambda = .990, $F(1, 46) = 0.45, p = .51, (\eta^2 = .010)$; SOA and shape/weight group, Wilks' Lambda = 1.00, $F(1, 46) = 0.02, p = .893, (\eta^2 = .000)$; or image type and SOA Wilks' Lambda = .968, $F(1, 46) = 1.51, p = .225, (\eta^2 = .032)$ were not significant. The three-way interaction between SOA, image type, and shape/weight group, was trending towards significance, Wilks' Lambda = .931, $F(1, 46) = 3.40, p = .072, (\eta^2 = .069)$. To understand this interaction, the data for each group were examined separately.

Low shape/weight group. A repeated measures ANOVA revealed no significant main effect for image, Wilks' Lambda = .966, $F(1, 23) = 0.82, p = .375, (\eta^2 = .034)$; or SOA, Wilks' Lambda = .996, $F(1, 23) = 0.08, p = .778, (\eta^2 = .004)$. This needs to be interpreted in light of a significant interaction between image and SOA, Wilks' Lambda = .818, $F(1, 23) = 5.12, p = .034, (\eta^2 = .182)$. This interaction is shown in Figure 3.3.

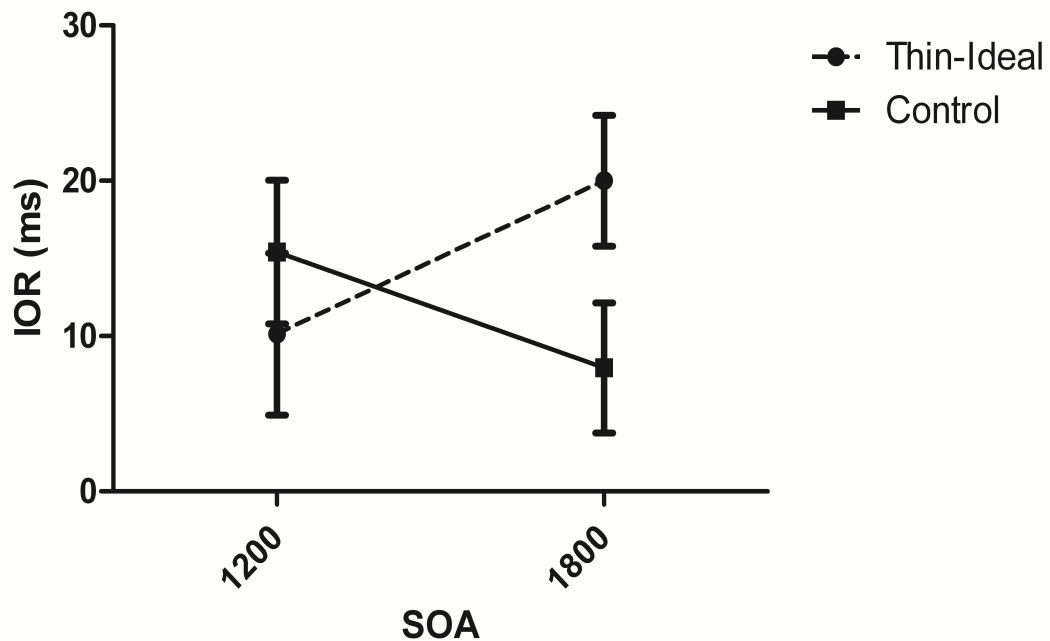


Figure 3.3. Mean IOR index scores (in milliseconds) for the thin-ideal and control images across 1200 and 1800 SOA for the Low shape/weight-based self-worth group. Error bars display +/- one standard error of the mean.

To clarify the nature of this interaction, simple effects analyses were conducted. A two-tailed paired samples *t*-test revealed no difference between IOR for the thin-ideal images at 1200 SOA ($M = 10.13$, $SD = 25.50$) and 1800 SOA ($M = 20.00$, $SD = 20.64$), $t(23) = -1.76$, $p = .092$ (mean difference = -9.87 , 95% CI: -21.479 to 1.73). Similarly, there was no significant difference between IOR for the control images at 1200 SOA ($M = 15.42$, $SD = 22.69$) and 1800 SOA ($M = 7.96$, $SD = 21.65$), $t(23) = 1.28$, $p = .212$ (mean difference = 7.46 , 95% CI: -4.57 to 19.48). Nor was there a difference between the IOR for the thin-ideal images and the control images at 1200 SOA $t(23) = -1.11$, $p = .278$ (mean difference = -5.29 , 95% CI: -15.13 to 4.55).

However, there was a marginally significant difference in the IOR for thin-ideal images and control images at 1800 SOA $t(23) = 2.05$, $p = .052$ (mean difference = 12.04 , 95% CI: -0.13 to 24.21), whereby participants displayed more IOR towards the

thin-ideal body images compared to the control images at the 1800 SOA. This pattern of results shows that individuals with low shape/weight-based self-worth, IOR to thin-ideal body imagery builds with SOA, consistent with increasing attentional disengagement from this specific type of image content.

High shape/weight group. A repeated measures ANOVA revealed no significant main effect for image, Wilks' Lambda = .998, $F(1, 23) = 0.04$, $p = .839$, ($\eta^2 = .013$); or SOA, Wilks' Lambda = 1.00, $F(1, 23) = 0.00$, $p = .983$, ($\eta^2 = .000$). Further, there was no significant interaction between image and SOA, Wilks' Lambda = .992, $F(1, 23) = 0.18$, $p = .680$, ($\eta^2 = .008$). These results indicate that there was no difference in IOR to the thin-ideal and control images at either SOA in the High group.

Discussion

The current study used an IOR task to investigate disengagement of attention from shape and weight stimuli in individuals with high and low levels of shape/weight-based self-worth. With regards to processing non-thin images, the High and Low groups displayed significant differences in IOR. Firstly, individuals in the High group showed a trend ($p = .065$) towards less IOR for the non-thin body images than the Low group. This difference in IOR was specific to the non-thin body images, suggesting that individuals who base their self-worth heavily on their shape and weight may have more difficulty disengaging attention from non-thin body images compared to individuals who do not base their self-worth on their body shape/weight. This tendency to maintain their attention on, or return their attention to, non-thin body images could play a role in these individuals becoming preoccupied with weight gain and having difficulty attending to other information in their environment. This is consistent with Vitousek and Orimoto's (1993) claim that individuals who possess a shape/weight-based self-worth schema preferentially process schema relevant information, which serves to

maintain their concerns about their body weight and shape. Despite this interesting finding, it must be noted that this result did not reach significance, and therefore would require replication to confirm.

The second main result for the non-thin images was that individuals in the Low group displayed increased IOR (i.e., increased disengagement of attention) regarding non-thin body images compared to the control images. This pattern of increased disengagement from the non-thin body images, in comparison to the control images, was not present in the High group. This suggests that individuals who do not invest their self-worth in their shape/weight may have a protective mechanism against the ongoing attentional processing of non-thin images, which may serve to minimise their risk of becoming preoccupied with concerns regarding weight gain. Since the High group did not display this potential protective factor, they may be at increased risk of over-processing images depicting weight concerns given an environment saturated with such imagery.

The finding that individuals with low levels of shape/weight-based self-worth display an increased IOR for non-thin ideal body images is consistent with research investigating IOR in anxiety. Specifically, Waters, Nitz, Craske, and Johnson (2007) found that individuals with low levels of trait anxiety displayed an increase in IOR towards aversive, compared with neutral and pleasant, images. They suggested that this was due to individuals low in trait anxiety inhibiting excessive attention of unpleasant material. This differential pattern was not found in the high trait anxiety group, suggesting they had difficulty inhibiting ongoing processing of such material.

With regards to the thin-ideal body images, individuals in the Low group displayed a trend ($p = .072$) towards increased IOR (i.e., increased disengagement) from the thin-ideal body images compared to control images, at least for longer SOAs

(1800ms). This is suggestive of a pattern similar to that found for the non-thin images, whereby the Low group exhibited evidence of a protective mechanism that inhibits attention from returning to thin-ideal body images. However, there was only a trend for this tendency toward increased attentional disengagement from the thin-ideal body images compared with the control images such that some caution is needed in interpreting this result.

The present study extends the research demonstrating biases in attentional maintenance to disorder-relevant stimuli in other clinical populations (Dai & Feng, 2009; Koster, De Raedt, Goeleven, Franck, & Crombez, 2005; Pérez-Dueñas et al., 2009; Verkuil et al., 2009) to demonstrate differences in attentional disengagement to body images in individuals with high and low levels of shape/weight-based self-worth. Only one previous study has utilised the IOR in an eating disorder context (Gao et al., 2013). In that study, it was found that individuals with elevated weight dissatisfaction had reduced disengagement from images depicting larger physiques. That finding accords with the results of the current study, whereby individuals in the High group displayed reduced disengagement from non-thin ideal body images. In addition, Gao et al. (2013) found that elevated body dissatisfaction was related to reduced disengagement from images depicting thin bodies at shorter SOAs (760ms), which they proposed would function to intensify shape/weight concerns. In the present study, the Low group manifested increased disengagement from thin-ideal images, which could serve to protect them from shape/weight concerns. Thus the findings across the two studies are comparable, with Gao et al. (2013) suggesting the presence of a pathological factor in the high body dissatisfaction group and the present study suggesting the presence of a protective factor in the low shape/weight-based self-worth group.

The current study had a number of strengths including its use of the widely used and robust IOR paradigm to assess a largely unexplored component of attention in this population, that is, the disengagement of attention. By assessing a single component of attention, our research represents an important and significant extension to the current literature which has focused on attentional biases in the initial capture of attention. Another strength of the study was its investigation of differences in attentional bias in individuals with differing levels of shape/weight-based self-worth. While this construct has been neglected in previous research, which has largely focused on body dissatisfaction, it is proposed to be the core psychopathology of eating disorders and is a key maintenance factor contributing to eating disorder symptoms.

Despite these strengths, the current findings need to be interpreted in light of a number of methodological limitations. Firstly, the small sample size would have limited the study's power, which may have contributed to the fact that several findings only entailed a trend towards significance (i.e., the High group showing less IOR to the non-thin body images than the Low group, and the Low group displaying increased IOR for the thin-ideal body images compared to the control images at 1800 SOA). As such, it would be of benefit to replicate the study in a larger sample of young women, as well as extending the study to diverse populations such as males (especially given emerging evidence of parity in body image concerns among males and females [McCabe & Ricciardelli, 2004; Murray et al., 2012]) and different ethnicities. Secondly, a community sample was utilised. While this provides insight into the possible attentional biases in individuals with elevated levels of shape/weight-based self-worth, care should be taken when extrapolating from these results to individuals with eating disorders, given research indicating differential patterns of attention in those with clinical levels of eating disorder symptomatology versus those at risk for eating disorders (e.g., Rieger et

al., 1998). Employing the current paradigm with a sample of individuals diagnosed with an eating disorder is therefore warranted. Thirdly, shape/weight-based self-worth is highly correlated with other aspects of eating disorder symptomatology (Cooper, 1997; Fairburn & Harrison, 2003) and general psychopathology (e.g., anxiety and depression), and therefore these factors may have also contributed to the current group differences (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Finally, cognitive models of eating disorders propose that attentional biases stem from dysfunctional schema about shape and weight, yet the EDE-Q is not a direct measure of this schema. Future research investigating differences in attention in individuals with varying levels of this schema would benefit from considering alternative, more direct schema measures, such as the eating disorder version of the sentence completion task (Rawal, Park, & Williams, 2010).

In summary, the present findings suggest that healthy individuals possess a protective mechanism that inhibits the over-processing of non-thin and thin-ideal body information. The reduction, or absence, of this protective mechanism in those with higher shape/weight-based self-worth may pose a risk factor in the development of eating disorder pathology.

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**Chapter Four. Study Two: Inhibition of Return Regarding Body
Words in Women with High or Low Shape/Weight-Based Self-Worth**

Inhibition of Return Regarding Body Words in Women with High or Low
Shape/Weight-Based Self-Worth

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Abstract

Cognitive models of body image disturbance and eating disorders implicate the role of attentional biases in the development and maintenance of body image concerns and disordered eating behaviours. Previous research has used a spatial cuing paradigm, measuring inhibition of return (IOR), to investigate attentional maintenance regarding non-thin and thin-ideal body images. The present study examined attentional biases to body (non-thin and thin) words in young adult (17-30 year-old) Caucasian females with high versus low levels of shape/weight-based self-worth. The IOR task was used to measure participants' disengagement of attention from non-thin and thin body words. The results indicated that the Low group displayed reduced IOR to non-thin words relative to control words; this pattern was not found in the High group. No significant differences in IOR were found for the thin words. These findings indicate that individuals with low shape/weight-based self-worth display differences in their disengagement of attention in response to non-thin body words, which may help to contribute to individual's ability to engage in healthy weight control behaviours. In combination with previous research, the findings suggest different attentional processing of body words versus images.

Keywords: Attentional Bias, Inhibition of Return, Disengagement, Body Words, Shape and Weight Concerns

The fields of body image and eating disorders draw on cognitive models to understand how information processing errors contribute to, and are influenced by, body image disturbances and eating disordered attitudes and behaviours. Cognitive models emphasise the central role of an individual's beliefs about the importance of shape and weight, and the resultant biased processing of shape and weight information, on the maintenance of symptomatology (Vitousek & Hollon, 1990; Williamson, White, York-Crowe, & Stewart, 2004). The importance of shape and weight primarily refers to the individual's tendency to base their self-worth on their shape and weight, and their ability to control them (Cooper, 1997; Fairburn, Cooper, & Shafran, 2003; Vitousek & Hollon, 1990; Vitousek & Orimoto, 1993). These beliefs (also referred to as schemas) are reflected in the current diagnostic criteria for both anorexia nervosa and bulimia nervosa, whereby for affected individuals, "self-evaluation is unduly influenced by body shape and weight" (American Psychiatric Association [APA], 2013, p. 345). When shape and weight become the basis for self-worth, dietary restraint, thinness, and weight loss are pursued as a means to establishing feelings of worthiness (Fairburn et al., 2003). Self-worth unduly influenced by an individual's shape and weight has also been implicated in the high rate of relapse seen in eating disorders (Fairburn & Harrison, 2003). Therefore, most other features of eating disorders are proposed to stem, at least in part, from this shape and weight schema.

A schema that unites beliefs about shape and weight with beliefs about self-worth, referred to as shape/weight-based self-worth, is proposed to result in systematic errors in information processing (Vitousek & Hollon, 1990). Specifically, cognitive models propose that individuals who possess this schema will display biases in processing information regarding shape and weight, through changes to selective attention (Vitousek & Hollon, 1990). Attentional biases are proposed to contribute to

the onset and maintenance of eating disorder symptomatology through increasing the salience of shape and weight information in an individual's environment. Cognitive models predict that individuals with elevated shape/weight-based self-worth, whether or not it has resulted in an eating disorder, will demonstrate biases in processing shape and weight information (Cooper, 1997; Faunce, 2002; Vitousek & Hollon, 1990).

While attentional biases in individuals with, or at risk of developing, eating disorders have been investigated for over 25 years, there have been inconsistencies in the research findings to date in terms of whether attention in individuals with, or at risk of, an eating disorder is biased toward or away from non-thin and thin-ideal body shape/weight stimuli (Aspen, Darcy, & Lock, 2013; Rodgers & DuBois, 2016). Therefore, the exact nature of these attentional biases remains unclear. Clarifying the nature of these attentional biases is a high priority for research given the central role these attentional biases have in current cognitive theories of eating disorders and body image disturbance (Aspen et al., 2013).

The Stroop colour-naming task (Stroop, 1935) was the first task used to investigate selective attention. Modified versions of the Stroop task using disorder-relevant words found increased colour-naming latencies for food, shape, and weight words relative to neutral words in individuals with eating disorders (Ben-Tovim & Walker, 1991; Ben-Tovim, Walker, Fok, & Yap, 1989; Cooper & Fairburn, 1992; Dobson & Dozois, 2004; Faunce, 2002; Lee & Shafran, 2004; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998) and in non-clinical samples of young women displaying features of eating disorders, including high levels of dietary restraint (Cooper & Fairburn, 1992; Green & Rogers, 1993; Perpiñá, Hemsley, Treasure, & de Silva, 1993). Overall, the results suggest that women with eating disorders demonstrate a small degree of preferential processing of weight and shape words. For non-eating

disordered controls, the results are more inconsistent but indicate a small degree of preferential processing for weight and shape words.

The Stroop task's inability to indicate whether increased colour-naming latencies reflect attention being directed towards or away from shape and weight words has been overcome through employing the visual-probe task (also referred to as the dot-probe task). In the visual-probe task faster reaction times to probes appearing in the same location as a shape/weight stimuli indicate attention is being directed towards these stimuli while slower reaction times indicate attention is being directed away (MacLeod, Mathews, & Tata, 1986). Utilising the visual probe task in a clinical sample with eating disorders, Rieger et al. (1998) investigated biases in attention regarding thin and non-thin body words. This research found that, unlike non-eating disordered participants (including those high in dietary restraint), individuals with eating disorders displayed a trend towards an attentional bias for body words connoting a large physique and away from body words connoting a thin physique. Gao et al. (2011) found a similar pattern of findings in a non-clinical sample. Specifically, weight dissatisfied individuals demonstrated an attentional bias in orientation and maintenance toward non-thin words, and an initial orientation bias followed by avoidance of thin words. In contrast to Gao et al. (2011), Placanica, Faunce, and Job (2002) found no difference in attentional biases for shape and weight words in individuals with high drive for thinness and body dissatisfaction.

Supporting the research by Rieger et al. (1998) using images instead of words, Shafran, Lee, Cooper, Palmer, and Fairburn (2007) found that individuals with eating disorders displayed attention towards images reflecting larger physiques and weight related stimuli. The results utilising body images in non-clinical samples are more inconsistent (Aspen et al., 2013). Overall, the research utilising the visual probe task

provides preliminary support for attentional biases towards non-thin stimuli and away from thin stimuli in individuals with eating disorders although the results are often inconsistent. One potential factor contributing to the inconsistent findings in non-clinical samples could be due to differences in comparison groups. Research has variously categorised groups based on weight/body dissatisfaction, drive for thinness, and other criteria. Yet, according to the cognitive models, the key individual difference variable impacting on information processing is shape/weight-based self-worth (Vitousek & Hollon, 1990).

Another possible explanation for these inconsistent results may be due to differences in the component of attention measured. That is, while the visual probe task has many strengths, it has difficulties differentiating the attentional components underpinning the bias. Specifically, biases in attention can be categorised into three main components: facilitation (i.e., disorder-relevant stimuli are detected faster than neutral stimuli), disengagement (i.e., more difficulty disengaging attention from disorder-relevant than neutral stimuli), and attentional avoidance (i.e., allocating attention in the opposite direction to the disorder-relevant stimuli) (Cisler & Koster, 2010; Koster, Crombez, Verschuere, & De Houwer, 2004; Posner, Inhoff, Friedrich, & Cohen, 1987). In the visual-probe task, faster reaction times for disorder-relevant stimuli that have been interpreted to indicate biases in attentional engagement may also be due in part to difficulty disengaging attention from that stimulus, or both (Koster et al., 2004; Shafran et al., 2007). Differentiating between these two components is important for understanding the nature of attentional biases in body image disturbance and eating disorders.

Therefore, an important adjunct to the visual-probe research is to directly measure just one component of attention. One such task is the spatial cueing task,

measuring disengagement of attention and Inhibition of Return (IOR) (Fox, Russo, & Dutton, 2002; Posner, 1980); as such, the task is also referred to as the IOR task. IOR is a mechanism of the visual system that encourages attention to be directed to new information in the environment, through inhibiting attention from returning to already attended locations (Posner & Cohen, 1984). Continual engagement with a stimulus comes at a cost of failing to attend to other information in the environment. Thus greater maintenance of attention towards schema-relevant stimuli could contribute to a greater effect of these stimuli on thoughts, emotions, and behaviours (Fox, Russo, Bowles, & Dutton, 2001). The IOR effect is robust (Klein, 2000) and is widely used in the investigation of attentional disengagement (Lupiañez, Klein, & Bartolomeo, 2006). Within the IOR task, lower IOR reflects reduced disengagement and greater attentional maintenance.

Inhibition of Return research suggests anxiety (Fox et al., 2002; Pérez-Dueñas, Acosta, & Lupiañez, 2009), depression (Dai & Feng, 2009), and obesity (Carters, Rieger, & Bell, 2015) are associated with selective difficulties disengaging attention from disorder-relevant information. In the field of eating disorders, those with elevated body dissatisfaction have been found to have less IOR (i.e., difficulty in disengaging attention) for images of thin and non-thin bodies (Gao et al., 2013). Using the spatial cuing paradigm, Schmitz, Naumann, Trentowska, and Svaldi (2014) investigated differences in attentional disengagement from food cues in individuals with binge eating disorder. These results suggested that binge eating disorder was associated with a difficulty disengaging attention from food cues.

Overall, these studies employing the spatial cuing task indicate that there are differences in attentional biases in the later stages of attention, such as the disengagement of attention, related to particular clinical disorders. Therefore, the IOR

paradigm provides a way of investigating whether individuals with high shape/weight-based self-worth have difficulty disengaging attention from body information. In this regard, Forsyth, Rieger, and Bell (in press) found that participants who did not base their self-worth on their shape and weight displayed significantly more IOR (i.e., greater disengagement of attention) for non-thin images compared with control images. This differential pattern of attention between the non-thin and control images was not evident in participants who based their self-worth on their shape and weight.

While studies to date have used pictorial stimuli, limited research has investigated whether there are differences in IOR for disorder-relevant word stimuli in an eating disorder context. The different findings in the literature on attentional biases could be due in part to the type of stimuli used, that is, whether words or images are utilised. The question as to whether words or images produce differing results in attentional tasks has been minimally investigated to date. However, research results suggest that there are indeed differences in the processing of pictorial and verbal stimuli in relation to pain-related cues (Dear, Sharpe, Nicholas, & Refshauge, 2011) and food cues (Freijy, Mullan, & Sharpe, 2014) in the visual-probe task. Whether attentional patterns for body words differ from the findings using body images in an IOR task (Forsyth et al., in press) has yet to be investigated.

The current study has two main aims. The first aim is largely methodological. We aim to provide an assessment of IOR when using words as attentional cues, thus assessing the validity of using a word-based IOR paradigm within the body image and eating disorder context. Based on the IOR paradigm, it is hypothesised that reaction times for the valid trials (i.e., when the target cross appears on the same side as the word cue) will be significantly slower than the reaction times for the invalid trials (i.e., when the target cross appears on the opposite side as the word cue), indicating the presence of

IOR for words.

The second aim of the study is to investigate whether there are differences in IOR for body words depending on an individual's level of shape/weight-based self-worth. Based on cognitive models of eating disorders and previous research, it is hypothesised that individuals with high shape/weight-based self-worth (the High group) will display differences in IOR for the non-thin and thin body words compared to individuals with low levels of shape/weight-based self-worth (the Low group). Given the novelty of the current research paradigm and the clear inconsistencies in current studies on attentional bias to shape/weight stimuli, no directional hypotheses are made regarding the exact nature of IOR in the High and Low groups across non-thin and thin words.

Methods

Participants

Female participants aged 17 to 30 years from the Australian National University were recruited via flyers and an internal psychology participation webpage. A female-only young adult sample was used to as they report the highest concerns around body image and eating disorder symptoms (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Stice, 2002; Swami et al., 2010). The sample was Caucasian-only to increase comparability with the study by Forsyth et al. (in press) using the IOR for body images and based on research indicating cultural differences in the cognitive processing of body stimuli (Chen & Jackson, 2005).

Two main criteria were used to exclude participants from the initial sample of 121 participants. Firstly, participants' data were excluded if they had a body mass index ($BMI = kg/m^2$) in the obese weight range ($BMI \geq 30$; World Health Organisation [WHO], 1998), due to research demonstrating differences in IOR between participants

in the normal and obese weight range for disorder-salient stimuli (Carters et al., 2015). Five participants were removed on this basis. Secondly, participants' data were excluded if they did not endorse either high or low levels of shape/weight-based self-worth; this was determined through two items from the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) (additional information about this is provided in the EDE-Q section). The data from 11 participants were excluded for this reason.

The final sample consisted of 105 participants aged 17 to 23 years ($M = 19.00$, $SD = 2.21$). Participation was voluntary and informed consent was gained prior to testing. Participants received AUD\$15 or 60 minutes of course credit as compensation for their participation. This study had full ethics approval from the Australian National University Human Research Ethics Committee.

Measures

Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994). The EDE-Q was primarily administered to allocate participants in terms of their self-reported levels of shape/weight-based self-worth. The EDE-Q is a 28-item self-report questionnaire assessing eating disorder symptomatology over the past 28 days. The EDE-Q is a widely used measure with strong psychometric properties (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004a, 2004b). In the current study, the Cronbach's alphas were .83, .81, .93, .90, and .96 for the Dietary Restraint, Eating Concern, Shape Concern, Weight Concern, and Global EDE-Q, respectively.

Of interest in the current study were two items assessing shape/weight-based self-worth. Consistent with Forsyth et al., (in press), participants were allocated to the Low group if they scored 0-2 (*not at all* to *slightly*) or the High group if they scored 4-6

(*moderately to markedly*) to either of the following EDE-Q items: “Over the past 28 days, has your shape/weight influenced how you think about (judge) yourself as a person?” If participants scored 3 on both items they were not allocated to a group and their data was excluded from analyses. Following allocation there were 59 participants in the Low group and 46 participants in the High group. These two items in the EDE-Q were selected based on research demonstrating single item measures of shape/weight-based self-worth are comparable to longer measures, such as the Shape and Weight Based Self-Esteem Inventory (Geller et al., 1998; Mitsui, Yoshida, & Komaki, 2017; Tchanturia, Troop, & Katzman, 2002), and reduce participant burden.

Materials

Word stimuli. The thin and non-thin body words were those used by Rieger et al. (1998). The non-thin words were comprised of 20 overweight body shape and weight words (e.g., “fat”) that were paired with 20 neutral words (e.g., “box”). The thin words were comprised of 20 thin body shape and weight words (e.g., “thin”) paired with 20 neutral words (e.g., “tile”). The neutral words used for both tasks included words relating to common household objects in order to ensure that they were drawn from a single category. The neutral words were matched on word length and usage frequency to the body words.

IOR tasks. An outline of the IOR task is displayed in Figure 4.1. The task involves the presentation of a central fixation cross followed by a peripheral cue (to the left or right of the fixation cross), the fixation cross brightens, and then the target is presented in the location that was occupied by the cue (valid trial) or the opposite side (invalid trial). The duration between the cue onset and the target onset is known as the Stimulus Onset Asynchrony (SOA). At shorter SOAs (e.g., SOAs of less than 300ms), facilitation occurs, where reaction times on the valid trials are faster than the invalid

trials. At longer SOAs, such as SOAs greater than 300ms, IOR occurs, whereby the reaction times for valid trials are longer than for the invalid trials.

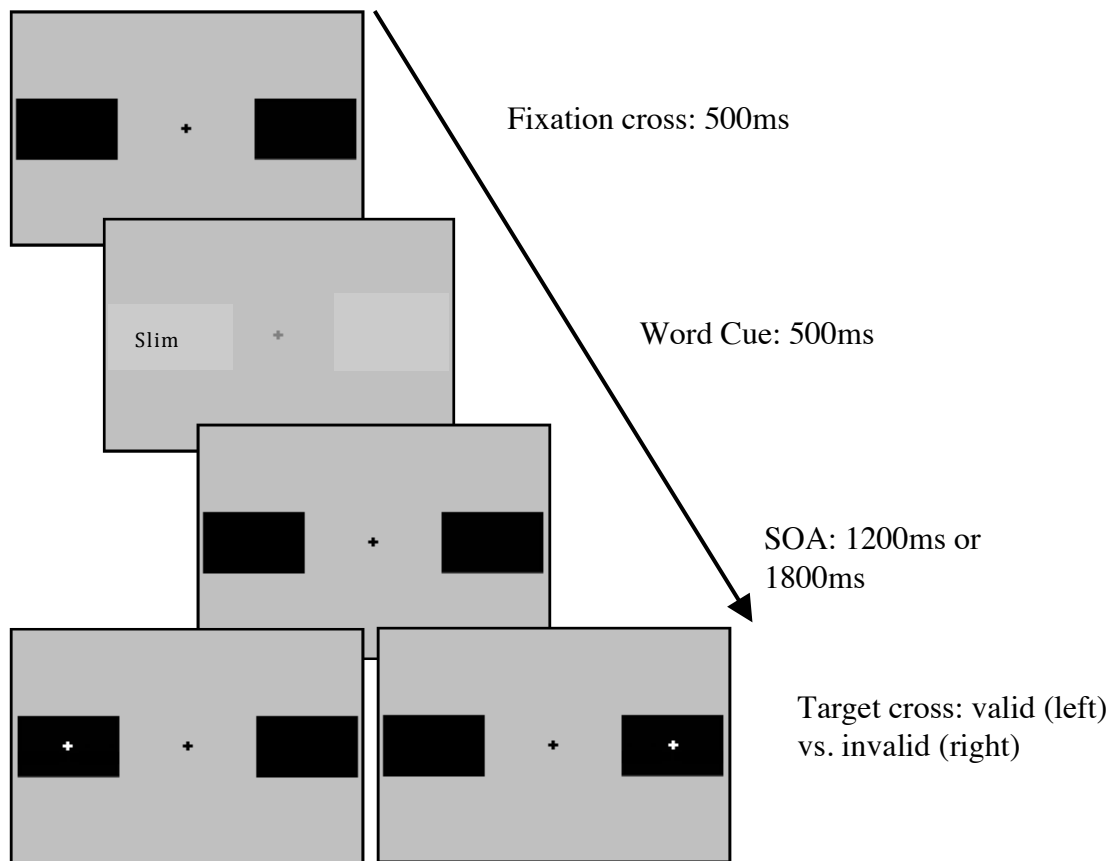


Figure 4.1. Example of the IOR paradigm trial sequence used in Study Two with an example of a thin-ideal body word.

Separate IOR tasks were run for the non-thin and thin body words in counterbalanced order. Two IOR tasks were administered on a computer using MatLab R2012b and the Psychophysics Toolbox software (Brainard, 1997). Participants were situated approximately 50cm from the monitor. Separate IOR tasks, with identical designs for the non-thin and thin words, were run in accordance with previous implementations of the IOR task (Carters et al., 2015; Forsyth et al., in press).

As described in Forsyth et al. (in press), for each IOR task the computer display was mid-level grey with black rectangle picture frames presented three degrees to the left and right of the central fixation cross. A central dark grey fixation cross was presented for 500ms at the beginning of each trial; a body or neutral word was then presented for 500ms, to the left or right of the fixation cross (centre of word = 3 degrees away from fixation cross). To cue the participant's attention back to the centre of the screen, the central fixation cross then changed luminance. Following a SOA of either 1200ms or 1800ms (which ever was randomly designated for that trial), a white target cross appeared in the cued (same location as the word; termed valid trial), or un-cued location (opposite location as the word; termed invalid trial). Participants indicated the position of the target cross using the left or right arrow keys on the computer keyboard with their dominant hand. The word and target appeared an equal number of times on each side of fixation and equally in cued or uncued locations. Additionally on 20% of trials no target cross appeared (termed "catch trials"). The no target condition was included to ensure that the participant was not responding automatically, as they had to restrain a response. The next trial began after a response or 2000ms. The SOAs of 1200 and 1800ms were selected based on previous research (Carters et al., 2015; Forsyth et al., in press), and an understanding of IOR data from a review by Klein (2000), indicating that IOR increases with SOA, beginning at longer SOAs for more complex than simple cues (e.g., spots of light). The current research used two SOAs (i.e., 1200 and 1800) for several reasons. Firstly, by only using one SOA, it is not possible to capture any changes in IOR that may occur over time. Secondly, as this is a relatively novel cognitive task in the area of eating and weight disorders, there is no consensus on the appropriate SOAs. As such, by using only one SOA it is possible to miss potentially valuable information.

Following five practice trials, 200 trials were separated into two blocks of 100 with a minimum rest period of 5000ms between. Each IOR task contained nine conditions, body and neutral word conditions (x 2), valid and invalid location (x 2), and 1200 and 1800 SOA (x 2), and a no target condition (x 1) where no target cross appeared. Each other condition was presented 20 times, in random order. The participants' reaction times and accuracy on each trial were recorded in a data file within Matlab. Each individual IOR task lasted approximately 12 minutes.

Procedure

Following expressing interest in the study the participant was allocated to an individual testing session lasting approximately one hour. On arrival participants read the study information sheet and provided written consent. Participants then completed the two IOR tasks; in between the two tasks participants had a minimum break of three minutes to reduce carryover effects. The order of the IOR tasks was counterbalanced across participants to minimise order effects. While completing the IOR tasks, participants were instructed to read the words aloud to ensure that they were engaging with the content of the word rather than responding to changes in luminance. After completing the IOR tasks, participants completed the EDE-Q and had their height and weight measured to calculate BMI.

Statistical Analysis

Data were analysed using SPSS, version 22. IOR index scores were calculated by using the mean correct reaction time data for the valid and invalid trials. IOR index scores were calculated by subtracting the mean reaction time on invalid trials from the mean reaction time on valid trials, whereby positive index scores indicate IOR, (longer reaction times for the valid compared with invalid trials), and negative IOR index scores indicate an absence of IOR (shorter reaction times for the valid than invalid trials).

For the IOR tasks, two mixed-design ANOVAs were conducted to examine if shape/weight-based self-worth (Low vs. High) influenced IOR at the two SOAs (1200ms and 1800ms) for each stimulus set, that is, (1) non-thin body words compared to neutral words or (2) thin compared to neutral words. Separate ANOVAs were run for non-thin and thin words, with group as the between-subjects variable and word type (non-thin, non-thin-matched control, thin, thin-matched control) and SOA (1200, 1800) as the within-subjects variables. Significance was assessed using an alpha level of .05 (no corrections were made for multiple comparisons to maximise power; Rothman, 1990) and effect sizes were based on Cohen (1988).

Results

Data Screening and Cleaning

Screening revealed that two participants had missing data for the non-thin IOR trials due to a computer malfunction. Screening of the IOR task data at the individual level was undertaken via Matlab and involved excluding reaction times on correct trials less than 200ms (Gao et al., 2011; Stoyanova, Pratt, & Anderson, 2007).

Analysis of univariate outliers at the group level (High vs. Low) revealed four extreme values with standardised scores exceeding 3.29 ($p < .001$). These were on the 1200 non-thin word IOR, 1200 and 1800 thin word IOR, and 1800 thin control word IOR. All of these outliers had a significant effect on normality. As such, they were removed from further analysis. Analysis of multivariate outliers using the Mahalanobis Distance revealed two cases ($p < .001$) that were not deemed legitimate parts of the target population. Normality was assessed at the group level using normal-weight plots, skewness and kurtosis values, and the Kolmogorov-Smirnov statistic. The non-thin control 1800 SOA IOR in the Low group displayed positive skew. This skew is common for measures of reaction times (Heathcote, Popiel, & Mewhort, 1991) and the

skewness statistics were not of concern (Tabachnick & Fidell, 2013). Therefore, no transformations or dichotomisations were undertaken, as parametric tests are tolerant of violations of this assumption with sample sizes of the present study (Norman, 2010). Scatterplots for the overall sample and at the group level showed generally linear and homoscedastic relationships. Lastly, Levene's test for equality of variance indicated that homogeneity of variance was present for all analyses where applicable.

A mean accuracy score of 75% or above on the IOR task was required for inclusion in the analysis, with no participants excluded on this basis. The mean accuracy was 98.98% ($SD = 1.25$) for the non-thin words, 98.83% ($SD = 1.50$) for the non-thin control words, 98.91% ($SD = 1.39$) for the thin words, and 98.87% ($SD = 1.45$) for the thin control words. In addition, the catch trials had a mean accuracy of 99.50% ($SD = 1.51$) for the non-thin words and 98.20% ($SD = 2.47$) for the thin words.

Sample Characteristics

Table 4.1 displays the descriptive data for the High and Low groups. Independent samples t -tests revealed no significant differences in age $t(103) = -0.27, p = .791, d = 0.055$ between the groups. Comparable to previous research (Gao et al., 2011), there were significant differences for BMI, $t(103) = -2.84, p = .005, d = 0.560$ between groups, there were higher BMIs in the High than Low group. Also consistent with previous studies (Lee & Shafran, 2008; Shafran et al., 2007), the High group was higher than the Low group in terms of dietary restraint $t(60.03) = -7.49, p < .001, d = 1.53$, eating concern $t(55.36) = -9.13, p < .001, d = 1.704$, shape concern $t(103) = -16.37, p < .001, d = 2.997$, weight concern $t(69.64) = -14.01, p < .001, d = 3.185$, and global eating disorder pathology $t(63.76) = -14.57, p < .001, d = 0.560$.

Table 4.1.

Sample Characteristics of the Low and High Shape/Weight-Based Self-Worth Groups in Study Two

Characteristics	Low (n = 59)	High (n = 46)
	Mean $\pm$ SD	Mean $\pm$ SD
Age	18.95 $\pm$ 2.40	19.07 $\pm$ 1.97
Body Mass Index (BMI)	21.40 $\pm$ 2.47	22.84 $\pm$ 2.67
Global EDE-Q Score	0.88 $\pm$ 0.53	3.11 $\pm$ 1.02
Eating Concern	0.48 $\pm$ 0.49	2.12 $\pm$ 1.27
Dietary Restraint	0.65 $\pm$ 0.65	2.32 $\pm$ 1.40
Shape Concern	1.46 $\pm$ 0.85	4.31 $\pm$ 0.93
Weight Concern	0.92 $\pm$ 0.71	3.70 $\pm$ 1.01

Note. EDE-Q = Eating Disorder Examination-Questionnaire

The Global EDE-Q scores of the Low group were comparable to other samples of women in the normal population once individuals with current diagnosed eating problems have been excluded (Aardoom, Dingemans, Slof Op't Landt, & Van Furth, 2012; Rø, Reas, & Stedal, 2015). The mean Global EDE-Q score of the High group was greater than the recommended cut-off score of 2.50, to discriminate between clinical and control groups (Rø et al., 2015). Therefore, based on the EDE-Q scores in the current sample, the Low group was comparable to the normal population and the High group was comparable to a clinical group.

IOR to Non-Thin Body Words

To assess whether there was an IOR effect for non-thin words, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (word type: non-thin and control) x 2 (validity: valid

and invalid) mixed-design ANOVA on raw reaction times was conducted.

The ANOVA revealed a large significant main effect for validity, Wilks' Lambda = .375, $F(1,102) = 169.68$, $p < .001$, $\eta^2 = .63$, whereby reaction times were significantly longer for the valid ($M = 430.28\text{ms}$) than invalid ($M = 405.84\text{ms}$) trials, indicating a strong IOR effect. There was also a large significant main effect for SOA, Wilks' Lambda = .353, $F(1,102) = 186.69$, $p < .001$, $\eta^2 = .65$, where overall reaction times were significantly longer at 1200 SOA ($M = 444.02\text{ms}$) than for 1800 SOA ($M = 392.10\text{ms}$). There was no significant main effect of word type, Wilks' Lambda = .989, $F(1, 102) = 1.10$, $p = .297$, $\eta^2 = .011$.

There was a significant two-way interaction between validity and SOA, Wilks' Lambda = .946, $F(1,102) = 5.78$, $p = .018$, $\eta^2 = .054$. The interactions between word type and validity, Wilks' Lambda = .994, $F(1,102) = 0.65$, $p = .43$, $\eta^2 = .006$, word type and SOA, Wilks' Lambda = .989, $F(1,102) = 1.17$, $p = .28$, $\eta^2 = .011$, and word type, validity, and SOA, Wilks' Lambda = .999, $F(1,102) = 0.074$, $p = .79$, $\eta^2 = .001$, were not significant.

To understand the significant interaction between SOA and validity, IOR index scores were calculated and then analysed. There was significantly greater IOR at 1200 SOA (27.05 ms) than at 1800 SOA (21.83ms), Wilks' Lambda = .948, $F(1,102) = 5.64$, $p = .019$, $\eta^2 = .052$, indicating that while IOR was present at both 1200 and 1800, there was a significant reduction in the size of IOR between 1200 and 1800.

Difference in IOR for non-thin body words between groups. To assess whether the High versus Low groups displayed a difference in IOR regarding the non-thin words compared to the matched non-body words, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (word type: non-thin and control word) x 2 (shape/weight-based self-worth group: Low and High) mixed-design ANOVA on IOR index scores was

conducted. The ANOVA revealed a main effect for SOA, Wilks' Lambda = .951, $F(1,101) = 5.20$, $p = .025$, $\eta^2 = .05$, indicating that there was significantly greater IOR at 1200 SOA ($M = 26.95$) than at 1800 SOA ($M = 21.89$), across both groups. There was no significant main effect of word type, Wilks' Lambda = .997, $F(1, 101) = 0.35$, $p = .553$, $\eta^2 = .003$, or shape/weight group, $F(1,101) = 0.01$, $p = .944$, $\eta^2 = .001$.

This needs to be interpreted in light of a significant two-way interaction between word type and group, Wilks' Lambda = .959, $F(1,101) = 4.35$, $p = .039$, $\eta^2 = .041$, indicating that IOR for words differed depending on group as shown in Figure 4.2. There were no significant two-way interactions between SOA and group, Wilks' Lambda = .995, $F(1,101) = 0.49$, $p = .487$, $\eta^2 = .005$, or word type and SOA, Wilks' Lambda = .999, $F(1,101) = 0.09$, $p = .765$, $\eta^2 = .001$. The three-way interaction between SOA, word type, and group was also not significant, Wilks' Lambda = .999, $F(1,101) = 0.103$, $p = .748$, $\eta^2 = .001$.

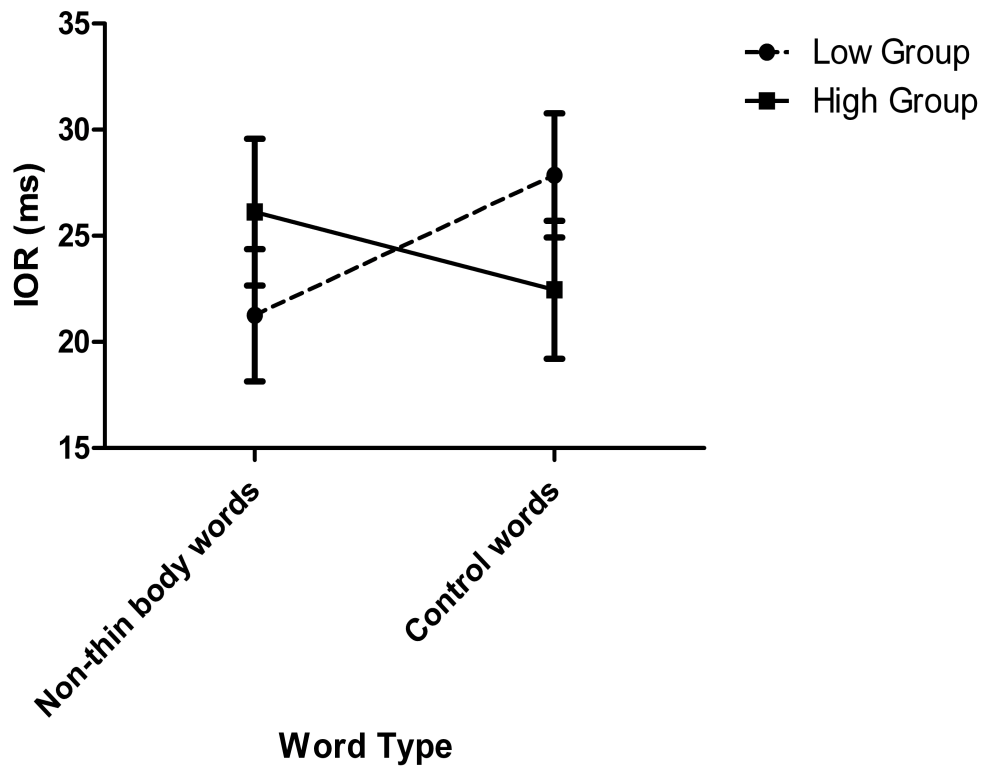


Figure 4.2. Mean IOR index scores (in milliseconds) for the non-thin and control words across the High and Low shape/weight-based self-worth groups. Error bars display +/- one standard error of the mean.

To clarify the nature of this interaction, simple effects analyses were undertaken. A paired samples *t*-test revealed a significant difference between the IOR for the non-thin body words versus the control words in the Low group $t(55) = -2.72, p = .009, d = 0.356$ (mean difference = -8.06, 95% CI: -14.00 to -2.12), where there was less IOR for the non-thin body words ($M = 20.13, SD = 22.78$) than the control words ($M = 28.19, SD = 22.44$). By comparison, there was no difference in IOR between the non-thin body words and control words in the High group, $t(45) = 1.00, p = .325, d = 0.166$ (mean difference = 3.66, 95% CI: -3.75 to 11.08).

An independent samples *t*-test revealed no difference between the IOR for the non-thin body images in the Low group ($M = 20.13, SD = 22.78$) and the High group (M

= 26.12ms, $SD = 22.59$ ms), $t(100) = -1.33$, $p = .187$, $d = 0.264$ (mean difference = -5.99, 95% CI: -14.95 to 2.96). Further, there was no significant difference in IOR for control images between the Low group ($M = 28.19$, $SD = 22.44$) and the High group ($M = 22.46$ ms, $SD = 21.64$ ms), $t(100) = 1.30$, $p = .195$, $d = 0.260$ (mean difference = 5.73, 95% CI: -2.99 to 14.45).

IOR to Thin Body Words

To determine whether there was an IOR effect for thin words, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (word type: thin and control word) x 2 (validity: valid and invalid) mixed-design ANOVA on raw reaction times was conducted. The ANOVA revealed a large effect for validity, Wilks' Lambda = .446, $F(1,103) = 127.88$, $p < .001$, $\eta^2 = .55$, such that reaction times were significantly longer for the valid (428.10ms) than invalid (404.13ms) trials, indicating a strong IOR effect. There was a significant effect for SOA, Wilks' Lambda = .354, $F(1,103) = 188.27$, $p < .001$, $\eta^2 = .65$, where reaction times were significantly longer at 1200 SOA (441.92ms) than 1800 SOA (390.31ms). There was no significant main effect of word type, Wilks' Lambda = .973, $F(1, 103) = 2.83$, $p = .095$, $\eta^2 = .027$.

There was a significant two-way interaction between validity and SOA, Wilks' Lambda = .956, $F(1,103) = 4.71$, $p = .032$, ($\eta^2 = .044$). The two-way interactions between word type and validity, Wilks' Lambda = .994, $F(1,103) = 0.58$, $p = .45$, $\eta^2 = .006$, and word type and SOA, Wilks' Lambda = .996, $F(1,103) = 0.38$, $p = .54$, $\eta^2 = .004$, were not significant. Further, the three-way interaction between word type, validity, and SOA was not significant, Wilks' Lambda = .999, $F(1,103) = 0.066$, $p = .798$, $\eta^2 = .001$.

To understand the interaction between SOA and validity for thin words, IOR index scores were analysed. There was significantly greater IOR at 1200 SOA (29.05

ms) than at 1800 SOA (20.35ms), Wilks' Lambda = .926, $F(1, 103) = 8.24$, $p = .005$, $\eta^2 = .074$, indicating that while IOR was present at both 1200 and 1800, it significantly reduced between 1200 SOA and 1800 SOA.

Differences in IOR for thin body words between groups. To investigate whether the High and Low groups displayed differences in IOR regarding the thin words compared to the control words, a three-way, 2 (SOA: 1200ms and 1800ms) x 2 (word type: thin body words and control words) x 2 (shape/weight-based self-worth: Low and High) mixed-design ANOVA on IOR index scores was conducted. This revealed a significant main effect for SOA, Wilks' Lambda = .923, $F(1, 102) = 8.57$, $p = .004$, $\eta^2 = .077$, indicating a significantly greater IOR at 1200 SOA ($M = 29.27$ ms) than at 1800 SOA ($M = 20.32$ ms). The main effects for word type, Wilks' Lambda = .980, $F(1, 102) = 2.079$, $p = .151$, $\eta^2 = .020$, and shape/weight group, $F(1, 102) = 0.181$, $p = .671$, $\eta^2 = .002$, were not significant. Additionally, there were no significant two-way interactions between word type and shape/weight group, Wilks' Lambda = .999, $F(1, 102) = 0.115$, $p = .735$, $\eta^2 = .001$, SOA and shape/weight group, Wilks' Lambda = .995, $F(1, 102) = 0.51$, $p = .475$, $\eta^2 = .005$, and word type and SOA, Wilks' Lambda = 1.00, $F(1, 102) = .017$, $p = .897$, $\eta^2 = .000$. The three-way interaction between SOA, word type, and shape/weight group was also not significant, Wilks' Lambda = .988, $F(1, 102) = 1.19$, $p = .278$, $\eta^2 = .012$.

Discussion

The current study used a spatial cuing task, measuring IOR, to investigate disengagement of attention from shape and weight words in individuals with high and low levels of shape/weight-based self-worth. The first aim of the current study was to investigate whether the IOR effect would be observed using word cues, as this paradigm has previously been used for images within body image and eating disorder research.

The second aim was to investigate differences in IOR regarding words in young women with high versus low levels of shape/weight-based self-worth.

With regards to the first aim, the current study found a strong and significant IOR effect for words (both body and control), whereby reaction times for the valid trials were significantly slower than reaction times for the invalid trials. This demonstrates the classic IOR effect, where attention is inhibited from returning to a recently attended location (Posner & Cohen, 1984). The findings thus extend previous research by demonstrating that IOR can be reliably produced for body words, and that words can therefore be used within the IOR paradigm to investigate differential patterns of the disengagement of attention in individuals with body image disturbance and eating disorders.

The current results also indicated a strong effect of SOA, where valid reaction times were longer than invalid reaction times at 1200 than 1800 SOA, indicating significantly greater IOR at 1200 SOA. It is possible that this is due to the nature of the stimuli used given that the onset of IOR varies with the complexity of the stimuli (Klein, 2000). As words are less complex stimuli than images, disengagement of attention and IOR may begin sooner, and thus already be reducing at the 1800 SOA measured in the current study.

With regards to the second aim investigating group differences in the disengagement of attention for non-thin and thin words, it was predicted that the High and Low groups would display differences in IOR regarding body compared with control words. The current results found evidence of differences in IOR for the body compared to control words between the High and Low groups, but only for non-thin words. For the non-thin words, participants in the Low group showed less IOR for the non-thin body words compared to the control words. This differential pattern of

attention was not found in the High group in that, participants who based their self-worth on their shape and weight, displayed no difference in disengagement of attention between the non-thin and control words. This is consistent with cognitive models of eating disorders and body image disturbance which claim that individuals who possess a shape and weight self-worth schema will process schema related information differently than individuals without this schema (Vitousek & Hollon, 1990; Williamson et al., 2004).

The present study extends research demonstrating biases in attentional maintenance to disorder-relevant images in other clinical populations, including anxiety (Fox et al., 2002; Pérez-Dueñas et al., 2009; Verkuil, Brosschot, Putman, & Thayer, 2009), depression (Dai & Feng, 2009; Koster, De Raedt, Goeleven, Franck, & Crombez, 2005), obesity (Carters et al., 2015), weight dissatisfaction (Gao et al., 2013), and binge eating disorder (Schmitz et al., 2014) to demonstrate differences in attentional disengagement for body words between individuals with high or low levels of shape/weight-based self-worth. To the best of our knowledge, no research has investigated IOR for body words within an eating disorder and body image context. As such, there is little research with which to compare the current results. The pattern of results pertaining to word stimuli is in some ways comparable to those found by Forsyth et al. (in press) using an image-based IOR, where there were differences in IOR for the non-thin versus the control images in the Low group alone. However, the current pattern of findings stands in contrast to those found in the Forsyth et al. study, as individuals who did not base their self-worth on their shape and weight displayed significantly *more* (rather than less) IOR for non-thin images compared with control images.

One possible interpretation of this differing pattern of results between the two studies could be due differences in stimulus complexity in to the processing of words

versus images. IOR starts later for more complex stimuli (Klein, 2000), as such, the reduced IOR seen in the Low group could be due to these individuals disengaging their attention more rapidly from the non-thin body words, compared with the control words. More rapid initial disengagement of attention would result in an earlier onset of IOR. Further, as IOR decays over time (Klein, 2000), an earlier onset of IOR for the non-thin images in the Low group would be seen as reduced IOR at the time points measured. As such, it is difficult to interpret whether the reduced IOR for the non-thin words in the Low group is due to faster initial disengagement followed by earlier onset and decay of IOR, or an actual delayed disengagement of attention. Future research using additional SOAs and/or including eye-tracking would help to clarify whether the current results for word stimuli are a methodological artifact stemming from the reduced complexity of words, or indicate a genuine delayed disengagement of attention from non-thin words in the Low group.

If this finding of a differing pattern of results for the processing of words versus images is indeed genuine, it could be due in part to analytical versus affective processing of the stimuli. A study by Freijy et al. (2014) utilising high- and low-calorie food words found that young women displayed an attentional bias towards low-calorie food words but away from high-calorie food words, while the reverse pattern was found for pictorial stimuli such that there was an attentional bias towards high-calorie food images but away from low-calorie food images. The researchers explained these findings in terms of differences in affective versus analytical processing. Specifically, the processing of images has been theorised to be influenced more by affective information (Hinojosa, Carretié, Valcárcel, Méndez-Bértolo, & Pozo, 2009), while the processing of words activates analytical processing. Freijy et al. (2014) proposed that at an analytical level the low-calorie foods are a healthier choice, and this drives attention

towards these foods and away from the high-calorie foods. Extending this interpretation to the current results, processing the analytical or informational content of the non-thin words in the Low group could be an adaptive mechanism if it encourages a level of awareness of the negative consequences of not engaging in healthy weight control behaviours. In contrast, due to the negative affect triggered by pictorial stimuli, the disengagement of attention from non-thin images as shown in the Low group in the study by Forsyth et al. (in press) would also be adaptive, given that affective distress is known to trigger disordered eating behaviours (Ricciardelli & McCabe, 2001; Stice, 1994; Stice, Nemeroff, & Shaw, 1996; Stice, Shaw, & Nemeroff, 1998).

With regards to the thin words, the current study found no differences in IOR between the High and Low groups. Previous research suggests that there are different attentional profiles for thin and non-thin body stimuli in non-clinical samples (Rodgers & DuBois, 2016). While attentional maintenance (Gao et al., 2013; Gao et al., 2011) has been found for non-thin body stimuli, this has not been replicated for thin stimuli. Thus while thin stimuli may affect attention at the early stages of visual processing, research thus far suggests that this is not maintained in later stages of visual processing (Gao et al., 2011; Rodgers & DuBois, 2016). Thus the current results accord with the existing body of research, indicating that there are no differences in the later stages of attention, namely maintenance of attention, towards thin stimuli, at least in a community sample.

The current study had a number of strengths including its use of the widely used and robust IOR paradigm (Klein, 2000; Lupiáñez et al., 2006) to assess a largely unexplored component of attention in body image and eating disorders research, that is, the disengagement of attention (Jiang & Vartanian, 2017). By assessing a single component of attention, the current study extends the literature which has focused predominantly on attentional biases in the initial capture of attention. Another novel

feature of this study is the use of words instead of images. Through understanding the patterns of attention to words compared with images, this study provides a potential partial explanation for the inconsistent findings in research to date, and expands understandings of the processing of different types of information (i.e., verbal versus pictorial). Another strength of the study was its investigation of differences in attentional bias in individuals with differing levels of shape/weight-based self-worth. While this construct has largely been neglected in previous research, it is proposed to be the core psychopathology of eating disorders and is a key maintenance factor contributing to eating disorder symptoms.

Despite these strengths, the current findings need to be interpreted in light of some methodological limitations. Firstly, a community sample was utilised. While this provides insight into the attentional biases in individuals with elevated levels of shape/weight-based self-worth, care should be taken when extrapolating from these results to individuals with eating disorders, given research indicating differential patterns of attention in those with clinical levels of eating disorder symptomatology versus those at risk for eating disorders (e.g., Jiang & Vartanian, 2017, Rieger et al., 1998). Employing the current paradigm with a sample of individuals diagnosed with an eating disorder is warranted. Secondly, individuals were instructed to read out the words while completing the IOR task. Reading out the words may have overridden any natural tendency to avoid processing the semantic content of the words, and thus affected natural group differences. To explore this further, the IOR task for body words could be run including conditions where some participants read out the words, whilst others do not. Thirdly, the word cues were presented for 500ms and only two SOAs were included in the current study. As such, the current results only pertain to these two time points, and care should be taken when extrapolating the results outside of this.

Therefore, additional presentation times and SOAs should be investigated, alongside the inclusion of eye-tracking tasks to investigate the changes to IOR over time.

In summary, the present findings demonstrate that words can be used to reliably produce IOR effects, and provide initial evidence to suggest that young women with low levels of shape/weight-based self-worth (i.e., healthy individuals) display reduced IOR for non-thin body words. This differential pattern of IOR for the non-thin and control words was not found for the High group, or for the thin words. This result indicated that individuals who do not base their self-worth on their shape and weight may disengage their attention differently from non-thin words, and this may provide a protective mechanism whereby individuals are able to process the analytical content of these words that would contribute to engaging in healthy weight control behaviours.

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**Chapter Five. Study Three: The Impact of Interpersonal Rejection and
Shape/Weight-Based Self-Worth on Inhibition of Return Regarding
Body Images**

The Impact of Interpersonal Rejection and Shape/Weight-Based Self-Worth on
Inhibition of Return Regarding Body Images

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Abstract

Emerging evidence suggests that experiences of interpersonal rejection are implicated in the development of eating disorder symptoms in vulnerable individuals, such as those with elevated levels of shape/weight-based self-worth. The current study investigated differences in attentional disengagement (using an spatial cuing task measuring inhibition of return [IOR]) regarding thin-ideal and non-thin body images following an experience of interpersonal rejection (using the Cyberball task) in individuals with high and low levels of shape/weight-based self-worth. Results revealed that despite the Cyberball task inducing feelings of rejection and lowered self-esteem, it did not differentially affect IOR regarding body (non-thin and thin-ideal) and control images, between those with high versus low shape/weight-based self-worth. Irrespective of interpersonal rejection or acceptance, individuals with low shape/weight-based self-worth displayed increased IOR to the non-thin body images compared with the control images, possibly indicating a protective mechanism that minimises ongoing processing of non-thin body images.

Eating disorders are complex, not well understood, and difficult to treat (Stice, 2002). While the symptoms of eating disorders differ across diagnoses, the frequent moving between diagnoses is suggestive of a shared core psychopathology (Fairburn, Cooper, & Shafran, 2003). It has been proposed that the core cognitive psychopathology of eating disorders is the tendency for individuals to evaluate their self-worth in terms of their shape, weight, and ability to control them (Fairburn et al., 2003; Fairburn & Harrison, 2003). This is recognised in the current diagnostic criteria for anorexia nervosa and bulimia nervosa (American Psychiatric Association [APA], 2013), and is a common feature of the cognitive (Vitousek & Hollon, 1990), cognitive-behavioural (Fairburn et al., 2003), and interpersonal (Rieger et al., 2010) models of eating disorders and body image disturbance.

Cognitive models of eating disorders and body image disturbance propose that this core psychopathology, referred to as shape/weight-based self-worth, results from a schema that unites beliefs about shape and weight with beliefs about self-worth (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; Vitousek & Hollon, 1990; Williamson, Stewart, White, & York-Crowe, 2002). This schema contributes to the development and maintenance of symptoms through producing information processing errors related to shape and weight (Cooper, 1997; Faunce, 2002; Vitousek & Hollon, 1990). As a result, individuals who possess a shape/weight- schema, such as those with eating disorders or body image disturbance, are predicted to display systematic biases in attention when processing shape and weight information in their environment (Vitousek & Hollon, 1990).

Understanding biases in attention are important as they can contribute to the development and maintenance of disordered eating and weight control behaviours, through increasing the salience of shape/weight information in the environment. Over

20 years of research has found support for differences in attention towards non-thin and thin body images in individuals with eating disorders in comparison to healthy controls (Dobson & Dozois, 2004; Faunce, 2002; Rieger et al., 1998; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998; Shafran, Lee, Cooper, Palmer, & Fairburn, 2007).

Attentional biases have been investigated in individuals with eating disorders through the use of the modified Stroop colour-naming task (Dobson & Dozois, 2004) and the visual-probe task (Aspen, Darcy, & Lock, 2013; Lee & Shafran, 2004; Rieger et al., 1998). While research has investigated attentional biases in eating disordered populations (see Aspen et al., 2013; Lee & Shafran, 2004 for reviews), little is known about the development and nature of such biases. For instance, of interest is whether individuals with elevated shape/weight-based self-worth consistently display these attentional biases or whether they are triggered/exacerbated under certain circumstances, such as following experiencing interpersonal stressors

Interpersonal difficulties feature in various models regarding the maintenance of eating disorder symptomatology (Fairburn et al., 2003; Rieger et al., 2010), due to a substantial body of research highlighting the association between interpersonal difficulties and eating disorder symptoms (Arcelus, Haslam, Farrow, & Meyer, 2013). Research suggests that interpersonal deficits may precede the illness. For instance, individuals with anorexia nervosa report more parental criticism than healthy individuals, or individuals who develop other psychiatric disorders, prior to the onset of their eating disorder (Pike et al., 2008). Moreover, following the development of an eating disorder, affected individuals report more negative social interactions than non-eating disordered controls (Grissett & Norvell, 1992). Interpersonal problems are proposed to exacerbate eating disorder symptoms, such as the finding that binge-eating

episodes are preceded by negative social interactions (Herzog, Keller, Lavori, & Ott, 1987; Steiger, Gauvin, Jabalpurwala, Séguin, & Stotl, 1999).

The relationship between interpersonal difficulties and eating disorder symptomatology has also been observed in non-clinical populations, with poor friendship quality and deficits in social support found to be related to increased dieting attempts (Paxton, Schutz, Wertheim, & Muir, 1999) and increased episodes of binge-eating (Stice, Presnell, & Spangler, 2002). Research has found that individuals who engage in chronic dieting consumed significantly more food following an experience of rejection than non-dieters, whereas there was no difference in food consumed following an experience of acceptance (Stroud, Tanofsky-Kraff, Wilfley, & Salovey, 2000). These findings have been replicated in similar studies (see Oliver, Huon, Zadro, & Williams, 2001; Tanofsky-Kraff, Wilfley, & Spurrell, 2000). Therefore, a large body of research highlights an association between interpersonal problems and eating disorder psychopathology in both clinical and non-clinical populations.

To explicate the role of interpersonal difficulties in maintaining eating disorder symptoms, Rieger et al. (2010) developed the Interpersonal Psychotherapy for Eating Disorders (IPT-ED) model. According to this model, individuals are vulnerable to engaging in eating disorder symptoms following the experience of negative social evaluation, which is defined as “actual or perceived negative feedback regarding one’s value to another individual or group” (Rieger et al., 2010, p. 402). Negative social evaluations are proposed to adversely affect individuals in part through their impact on an individual’s self-esteem (Rieger et al., 2010). This proposition stems from Sociometer theory, according to which self-esteem provides individuals with a measure of their level of acceptance, or rejection, by others (Leary & Baumeister, 2000). Thus, when an individual’s sense of acceptance is threatened, their self-esteem decreases.

Individuals for whom concepts of self-esteem and shape/weight are connected (i.e., those with shape/weight-based self-worth) will experience any threat to self-esteem as a threat to body-esteem. Due to the drive to re-establish self-esteem, shape and weight information becomes more salient, which drives behaviours such as strict dieting and other maladaptive weight control behaviours. This was demonstrated in research by Lampard, Byrne, and McLean (2011) where shape/weight-based self-worth mediated the effect of interpersonal rejection on weight control behaviours. Specifically, interpersonal problems contributed to disordered eating through their adverse effect on self-esteem, which in turn contributed to the pursuit of behaviours in the domain of shape and weight. In summary, according to the IPT-ED model, lowered self-esteem, as a result of negative social evaluation, triggers heightened awareness of shape and weight information, due to the connection between self-worth and shape and weight, which then drives body control behaviours in order to restore self-esteem.

In addition to behavioural changes, research suggests that interpersonal rejection may affect early-stage perceptual processes such as attentional biases (DeWall, Maner, & Rouby, 2009). In the area of social anxiety, interpersonal rejection has been shown to modify attention towards motivationally relevant stimuli (Tanaka & Ikegami, 2015). Here it was found that, following an experience of exclusion, individuals' displayed biased orientation of attention towards stimuli that were consistent with their motivation to achieve social acceptance. This is proposed to occur due to the individual's increased need to restore self-esteem by re-establishing social connection (DeWall et al., 2009). From this, it is proposed that for individuals who base their self-worth on their shape/weight, an experience of interpersonal rejection would bias their attention towards shape/weight information. This is an important area of research as changes to early stage processing, such as attention, are implicated in later stage processing and

behaviours (e.g., restrictive eating, body checking, or fat feelings in the context of eating disorders) (DeWall et al., 2009).

However, to date, limited research has investigated the role of interpersonal difficulties and attentional biases to shape and weight stimuli in eating disorders. One study that has investigated the impact of negative social evaluation on eating disorder symptoms (O'Driscoll & Jarry, 2015), including attentional biases (O'Driscoll, 2013), in women who base their self-worth on their body weight, found limited results. Following an experience of interpersonal rejection, individuals with elevated body weight self-worth unexpectedly did not display differences in attentional biases towards thin or non-thin body words. More recently a study conducted by Rieger, Dolan, Thomas, and Bell (2017), using the Cyberball task to induce rejection found that, in response to an experience of rejection, individuals with high shape/weight-based self-worth showed reduced avoidance of thin-ideal body images, compared with individuals who did not base their self-worth on their shape and weight, as measured through the dot-probe task.

While this study is noteworthy in seeking to understand the impact of interpersonal rejection on eating disorder symptoms, there are several methodological limitations that may have influenced the results. Firstly, the experimental manipulation of interpersonal rejection used did not reliably reduce self-esteem, which according to the IPT-ED model, is the mechanism via which interpersonal rejection elicits eating disorder symptoms (Rieger et al., 2010).

Secondly, the interpersonal rejection employed in this study involved participants engaging in a face-to-face discussion with their peers, then being asked to select two participants to work with. All participants were told that they would be completing the remainder of the study on their own because either (1) “no other

participants chose to work with [them]” (rejection condition) or (2) “there has been a mistake assigning [them] to a group” (control condition) (O’Driscoll & Jarry, 2015, p. 38). It is possible that control participants experienced this feedback as rejecting rather than neutral since their expectation that they would be working with others was not met due to unambiguous reasons. This is somewhat problematic given that ambiguous feedback can reduce self-esteem (Lieberman, Cathro, Nichol, & Watson, 1997). Therefore, an unambiguous paradigm of interpersonal rejection needs to be employed. One such paradigm is the computer-based ostracism task, Cyberball, a widely used program to experimentally induce a momentary experience of ostracism (Hartgerink, van Beest, Wicherts, & Williams, 2015). In the Cyberball task, participants engage in virtual ball-tossing game with two other ‘players’ connected over the Internet. They are instructed to select one of the two players to pass the ball to. The two other players, however, are computer generated. Participants allocated to the inclusion condition continue to receive the ball from the other players throughout the game, while participants in the exclusion condition receive the ball initially and then are not passed the ball again but watch the other players pass between themselves.

A final aspect of the O’Driscoll (2013) study that may have failed to yield evidence of attentional bias in those with shape/weight-based self-worth after rejection is the fact that attentional biases were measured through the use of a visual-probe task. Significant inconsistencies exist in the findings from research using the visual-probe task for shape/weight stimuli (Aspen et al., 2013). Discrepant results across studies may be due at least in part to the visual-probe task measuring different stages of attention (Cisler & Koster, 2010). One experimental method employed to overcome this limitation is to use a paradigm that measures only one component of attention, such as disengagement of attention (Cisler & Olatunji, 2010). A frequently used paradigm to

investigate the disengagement of attention is the spatial cuing task, measuring Inhibition of Return (IOR; Klein, 2000).

Inhibition of return (IOR) is a mechanism of the visual system that inhibits attention from returning to previously attended locations, thereby allowing attention to be allocated to novel information in the environment (Posner & Cohen, 1984). Difficulty disengaging attention refers to the degree to which a stimulus holds attention and impairs attention being reallocated to another stimulus, as such it is related to attention maintenance (Cisler & Koster, 2010). The IOR paradigm provides a means of investigating disengagement of attention from particular information. The IOR paradigm has been used to demonstrate selective deficits in attentional disengagement in several forms of psychopathology. For instance, research has found reduced attentional disengagement from disorder relevant stimuli in anxiety (Fox, Russo, & Dutton, 2002; Pérez-Dueñas, Acosta, & Lupiáñez, 2009; Verkuil, Brosschot, Putman, & Thayer, 2009) and depression (Dai & Feng, 2009). In the area of eating and weight disorders, research has found an association between difficulty disengaging attention from body pictures and elevated levels of body dissatisfaction (Gao et al., 2013), and females in the obese weight range have been found to display difficulty disengaging attention from food images compared with those in the normal-weight range (Carters, Rieger, & Bell, 2015). This body of research suggests that different forms of psychopathology are associated with difficulties disengaging attention from disorder-relevant stimuli.

The aim of the current study is investigate if interpersonal rejection is implicated in triggering attentional biases in individuals who base their self-worth on their shape and weight. Specifically, this research will utilise the Cyberball task to examine its effect on IOR to non-thin and thin-ideal body images in individuals with high levels of

shape/weight-based self-worth (the High group) and low levels of shape/weight-based self-worth (the Low group).

In line with the IPT-ED model, it is hypothesised that the relationship between interpersonal rejection and attentional biases regarding non-thin and thin-ideal body images will depend on the degree to which individuals base their self-worth on their body weight and shape. Specifically, it is hypothesised that individuals in the High group who experience interpersonal rejection will demonstrate differences in IOR for the non-thin and thin-ideal images, compared with individuals in the Low group, or individuals in the High or Low group who experience acceptance.

Methods

Participants

Young women were recruited given that eating disorders predominantly affect females and this is the peak age of onset for eating disorder symptoms (American Psychiatric Association [APA], 2013, Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013; Stice, 2002; Swami et al., 2010). One hundred and seventy eight female participants, aged 17 to 30 years ($M = 19.09$, $SD = 1.78$), expressed interest in participating in the study.

The research was advertised as a study on ‘mental visualisation and other cognitive processes in young women’ in order to conceal the study’s true aims and minimise demand characteristics. Initially, participants completed an online health questionnaire to assess current eating disorder symptoms. Participants who reported symptoms suggestive of an eating disorder were excluded as they may already display attentional biases for body images (Rieger et al., 1998). Fifteen participants were excluded because they reported a Body Mass Index ($BMI = kg/m^2$) of 18.5 or below, as per current diagnostic criteria for anorexia nervosa (APA, 2013). Six participants were

excluded because they reported a BMI of 30 or more and were thus in the obese range (World Health Organisation [WHO], 2006). These participants were excluded given that individuals with obesity have been found to display attentional biases in relation to disorder relevant stimuli (Carters et al., 2015). A further three participants were not included in the data analysis, as they either had a BMI less than 18.5 or greater than 30 when measured at the testing session. Sixteen participants were excluded for engaging in binge-eating episodes (i.e., eating an unusually large amount of food accompanied by a sense of loss of control) four or more times over the past month, as per current diagnostic criteria for bulimia nervosa and binge eating disorder (APA, 2013). Forty-three participants completed the screening questionnaire but did not attend the testing session. Participants' data were also excluded if they did not endorse either high or low levels of shape/weight-based self-worth based on their responses on the Eating Disorder Examination Questionnaire (EDE-Q, outline further below); data from four participants were excluded for this reason.

The final sample consisted of 90 participants aged 17 to 30 years ($M = 19.11$, $SD = 1.75$). Participation was voluntary and informed consent was gained prior to testing. Participants could elect to either receive AU\$10 or 60 minutes course credit as compensation for participation. The ethical aspects of the study were approved by the Australian National University Human Research Ethics Committee.

Measures

Demographic and Health-Screening Questionnaire. An 18-item questionnaire was used to obtain participant demographic information and to screen out participants who demonstrated symptoms suggestive of an eating disorder diagnosis. Demographic questions included age, nationality, and university major. Eating disorder screening questions included weight and height, for BMI calculations as per anorexia nervosa

diagnostic criteria, and binge eating behaviours, as per bulimia nervosa and binge eating disorder criteria. To conceal the aims of the study, these questions were embedded among distractor questions that asked about other health-related behaviours, including smoking, drinking, exercise, and sun exposure.

Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994). The EDE-Q was primarily administered to allocate participants to the Low and High groups. The EDE-Q is a 28-item self-report questionnaire that assesses severity and frequency of eating disorder psychopathology over the past 28 days. It is a widely used instrument due to its sound psychometric properties (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004a, 2004b) including acceptable internal consistency for the global and subscale scores (Peterson et al., 2007). In the current study, the Cronbach's alphas were .79, .73, .90, .85, and .94 for the Dietary Restraint, Eating Concern, Shape Concern, Weight Concern, and total EDE-Q, respectively.

Of particular interest in the present study were the two items assessing shape- and weight-based self-worth. Specifically, participants were allocated to the Low group if they scored 0-2 (*not at all* to *slightly*) or the High group if they scored 4-6 (*moderately* to *markedly*) on either of the following EDE-Q items: "Over the past 28 days, has your shape/weight influenced how you think about (judge) yourself as a person?" If participants scored 3 on both items, they were not allocated to a group and their data was excluded from the final analyses. Following allocation, there were 40 participants in the Low group and 50 participants in the High group.

Balanced Inventory of Desirable Responding (Paulhus, 1991). The Balanced Inventory of Desirable Responding (BIDR) is a 40-item self-report questionnaire used to assess social desirability bias, that is, the tendency to respond to questions in a socially desirable manner (Ellingson, Smith, & Sackett, 2001; Paulhus, 1991). It

consists of two subscales: Self-Deception Enhancement (i.e., the unintentional/unconscious tendency to portray oneself in a favourable light) and Impression Management (i.e., the intentional/conscious distortion of one's self-image to be perceived positively by others) (Li & Bagger, 2007). Each subscale is comprised of 20 items, with participants indicating the extent to which they agree with the statements on a 7-point Likert scale, ranging from 1 (*not true*) to 7 (*very true*). Example items include, 'My first impressions of people usually turns out to be right' (Self-Deception Scale) and 'I never cover up my mistakes' (Impression Management subscale). Items rated as 6 or 7 contribute to the total scores, with higher overall scores indicating a greater tendency to engage in socially desirable responding (Paulhus, 1991). Response biases have the potential to undermine the validity of inferences made from self-report data, and therefore participants' socially desirable responding was assessed to ensure that this was equivalent across conditions. The BIDR has adequate internal consistency, test-retest reliability (Li & Bagger, 2007), and validity (Lanyon & Carle, 2007; Paulhus, 1991). In the present study, the Cronbach's alphas were .67, .77, and .67 for the Self-Deceptive Enhancement scale, the Impression Management scale, and the overall BIDR, respectively.

State Self-Esteem Scale (Heatherton & Polivy, 1991). Items from the State Self-Esteem Scale (SSES) were included as a manipulation check for the interpersonal rejection/acceptance task. Participants were required to respond to the statements, 'Right now I feel displeased with myself' and 'Right now I feel good about myself' on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*extremely*). These specific items were selected from the SSES because they have the highest item-total correlations of .74 and .71, respectively (Heatherton & Polivy, 1991). Only a brief version of the SSES was administered in the current study to reduce the time between the experimental

manipulation and the measure of attention. Moreover, items were selected from the SSES given research supporting its psychometric properties including its sensitivity to change that occurs as a result of experimental manipulations (Heatherton & Polivy, 1991).

Materials

Picture stimuli. Images were used as cues in the IOR task. Two separate IOR experiments were run in random order across participants. In one IOR task, 20 target images depicting thin-ideal body shapes were paired with 20 control animal images. Thin-ideal images were defined as images of weight-related female body parts that were slender and had little/no body fat. In the other IOR task, 20 target non-thin images were paired with 20 control animal images. Non-thin stimuli consisted of realistic images of weight-related female body parts defined as representing BMIs in the upper normal to overweight range since the mean BMI of Australian women is 26.7 (Australian Bureau of Statistics [ABS], 2013).

Images were sourced from the Internet to reflect images women are exposed to in popular media so as to maximise ecological validity. All images were standardised to 300 pixels x 200 pixels, or 5.4 degrees wide and 3.4 degrees in height. For each IOR task, the relevant body and control images were matched on valence (positive/negative) and arousal (level of interest) to control for any effect these factors may have on attentional biases (Fox et al., 2002). These matchings were based on a pilot study undertaken with a separate pool of 40 female participants who had a mean age of 18.3 ($SD = 1.63$). The thin-ideal body images and their paired control animal images did not significantly differ on valence ($t(38) = -1.76, p = .086$) or arousal ($t(38) = -.66, p = .510$). Similarly, there was no significant difference between the non-thin body images

and their paired animal images on valence ($t(38) = -1.75, p = .088$) or arousal ($t(38) = -1.674, p = .102$).

Experimental measure of interpersonal acceptance/rejection: Cyberball. A large body of research investigating interpersonal rejection has employed the computer based ostracism task, Cyberball (Williams, Cheung, & Choi, 2000), to experimentally induce an experience of ostracism (Hartgerink et al., 2015). The Cyberball task has been shown to sufficiently replicate a face-to-face experience of ostracism, while being standardised and less aversive (Zadro, Williams, & Richardson, 2004). Research has shown that even when participants know that they are playing against a computer, they experience a reduction in self-esteem (Zadro et al., 2004). The Cyberball paradigm has been used within the eating disorder context (Salvy et al., 2012).

Participants completed the Cyberball task, where they were required to pass a ball with two computer-simulated players for two minutes. Participants were told that they were completing a task of mental visualisation and were encouraged to practice visualising the other players and the unfolding game. Participants pass the ball to the other players by clicking on the player icons; they must then wait until the ball is thrown to them before they can pass it again. Participants were randomly allocated to one of two conditions: the acceptance or rejection condition. In the acceptance condition, participants received the ball on 33% of occasions, that is, they received the ball the same number of times as the other two players, which has been shown to induce feelings of acceptance (Williams et al., 2000). Participants allocated to the rejection condition received the ball on 5% of occasions: specifically, they received the ball two times at the beginning of the game and then not again for the remainder of the game, during which time they continued to watch the other two players pass the ball between themselves, which has been shown to be sufficient to induce feelings of rejection and

lowered self-esteem (Zadro et al., 2004). The time taken by each of the computer-generated players to throw the ball was varied each turn to increase the believability that the two other participants were real people. The participants were told that they were playing with two other players in separate rooms connected over the internet. The researcher briefly explained the game and then participants were required to read the instructions on the screen while the researcher left the room for two minutes to supposedly confirm that the other participants were ready to commence the game.

Manipulation check. Several items were included to evaluate the effectiveness of the interpersonal rejection or acceptance manipulation, derived from a study by Zadro et al. (2004). Participants were required to indicate the percentage of ball tosses they received between 0% and 100% on a sliding scale to assess whether they correctly perceived the acceptance or rejection condition. In addition, participants were required to rate their agreement to two questions regarding how included they felt in the game, using a 5-point Likert scale (1 = '*not at all*' to 5 = '*extremely*'). These questions were, 'To what extent were you included by the other participants in the game?' and 'Did you feel that the other participants excluded you?'

IOR tasks. In line the IOR procedure used for Study One (Chapter Three), and Study Two (Chapter Four), the IOR task (demonstrated in Figure 5.1) involved the presentation of a central fixation cross, followed by a peripheral picture cue presented to the left or right, then the fixation cross reappears, and then a target is presented in the location previously occupied by the cue (valid trial) or the opposite location (invalid trial). The duration between the cue onset and the target onset is known as the Stimulus Onset Asynchrony (SOA). At shorter SOAs, facilitation, where reaction times on the valid trials are faster than the invalid trials. At longer SOAs, IOR is present, where

reaction time for valid trials is longer than the invalid trials. Lower IOR reflects reduced disengagement, and increased IOR reflects greater disengagement.

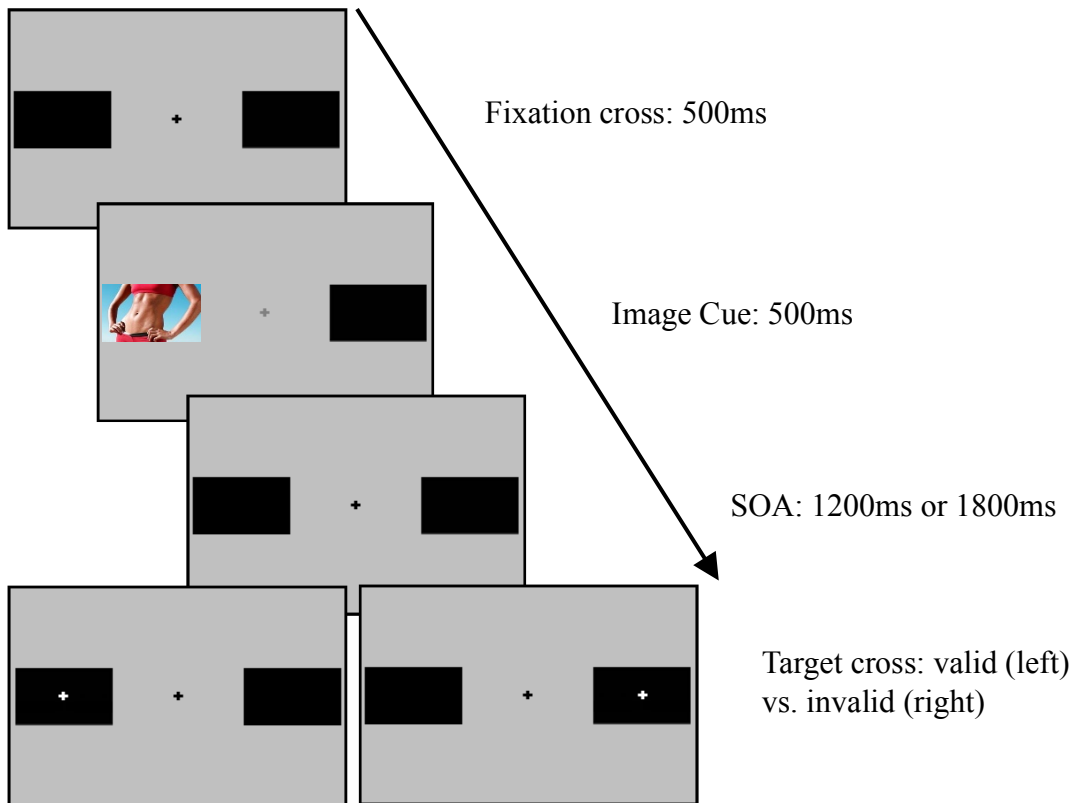


Figure 5.1. Example of the IOR paradigm trial sequence used in Study Three with an example of a thin-ideal body image.

The IOR tasks were administered on a computer using MatLab R2012b and the Psychophysics toolbox software (Brainard, 1997). Separate IOR tasks, with identical designs for the non-thin and thin ideal images, were run in accordance with previous implementations of the IOR task (Carters et al., 2015; Forsyth, Rieger, & Bell, in press). Participants sat approximately 50cm from the monitor.

For each IOR task, the computer display was set to a mid-level grey and throughout the task black rectangle picture frames were presented three degrees to the left and right of the central fixation cross. Each trial began with the presentation of a

central dark grey fixation cross for 500ms, followed by an image for 500ms, in either the left or right frame. The central fixation cross then changed brightness to cue the participant's attention back to the centre of the screen. Following a randomly designated SOA for that trial (either 1200ms or 1800ms), a white target cross appeared in either the cued (same location; valid trial) or un-cued (opposite location; invalid trial) location. The image and target appeared an equal number of times on each side of fixation and equally in terms of being matched or unmatched in location. Participants responded by indicating the position of the target cross using the left or right arrow keys on the computer keyboard using their dominant hand. The next trial began after a response or 2000ms.

Five practice trials were followed by 200 trials, separated into two blocks of 100 trials with a minimum rest period of 5000ms between the blocks. Each IOR task contained nine conditions: body and animal image conditions (x 2), a valid and invalid location (x 2), at 1200 and 1800 SOA (x 2), and a no target condition (termed "catch trial") (x 1) where no target was presented. The latter condition was included to ensure that participants were not responding automatically; catch trials occurred on 20% of all trials. Each condition was presented 20 times, in random order. The participants' reaction times and accuracy on each trial were recorded in a data file within Matlab. Each IOR task took approximately 12 minutes to complete.

A mean accuracy score of 75% or above was required for inclusion in the analysis, with one participant's data excluded on this basis. The mean accuracy was 99.21% ($SD = 1.17$) for the non-thin images and 99.09% ($SD = 1.40$) for the thin-ideal images. In addition, the catch trials had a mean accuracy of 99.58% ($SD = 2.70$) for the non-thin images and 99.43% ($SD = 3.22$) for the thin-ideal images.

Procedure

To determine participants' eligibility, they first completed an on-line health-screening questionnaire. Participants who were deemed eligible were invited to participate and allocated a testing time. Participants were tested individually in a private, well-lit, distraction-free room. A standard script and procedure was used to ensure maximum standardisation across participants. The study lasted approximately one hour.

On arrival participants read the study information sheet and provided written consent. Participants first completed the BIDR (Paulhus, 1991) followed by the Cyberball task (Williams et al, 2000). Participants completed the manipulation check and SSES items following completion of the Cyberball task. Participants then completed the two IOR tasks in counterbalanced order followed by the EDE-Q and having their height and weight measured (to calculate BMI). To exclude participants who had discovered the study's true intentions, participants were asked what they believed the study was about (no participants were excluded on this basis).

Statistical Analysis

Data was analysed using SPSS, version 22. Preliminary analyses using independent samples *t*-tests were conducted to assess differences between the acceptance and rejection conditions on age, BMI, and the BIDR. For the manipulation checks, independent samples *t*-tests were performed to ascertain whether participants in each condition perceived a significantly different number of ball-tosses and reported significant differences in SSES items and feelings of exclusion.

Screening revealed no errors of entry and no missing data. Screening of the IOR task data at the individual level was undertaken via Matlab and involved excluding

reaction times on correct trials less than 200ms (Gao et al., 2011; Stoyanova, Pratt, & Anderson, 2007).

IOR index scores were calculated by using the mean correct reaction time data for the valid and invalid trials. The IOR index score is calculated by subtracting the mean reaction time on invalid trials from the mean reaction time on valid trials. As a result, a positive IOR index score indicates IOR, whereas a negative IOR index score indicates the absence of IOR.

For the IOR task, two mixed between-within subjects ANOVAs were conducted to examine whether the Cyberball tasks (accepted vs. rejected) and shape/weight-based self-worth (Low vs. High) influenced IOR at the two SOAs (1200ms and 1800ms) for each image set, that is, (1) thin-ideal compared to control images or (2) non-thin compared to control images. Separate ANOVAs were conducted for thin-ideal and non-thin body images, with Cyberball group (accepted, rejected) and shape/weight-based self-worth group (High, Low) as between-subjects variables, and picture type (thin ideal, thin-matched control, non-thin, non-thin-matched control) and SOA (1200, 1800) as the within-subjects variables. Significance was assessed using an alpha level of .05 and effect sizes were based on Cohen (1988), with no adjustment for multiple comparisons in order to maximise power (Rothman, 1990).

Results

Data Screening and Cleaning

Analysis of univariate outliers at the group level (Low vs. High) revealed five extreme values with standardised scores exceeding 3.29 ($p < .001$). These were on the 1200 non-thin IOR, 1200 and 1800 non-thin control IOR, 1200 thin-ideal IOR, and the 1200 thin-ideal control IOR. The data was analysed both with and without these extreme values. This analysis revealed that two of these outliers had a significant effect

on the normality of the 1200 IOR thin-ideal and 1200 IOR thin-ideal control condition. As such, they were removed from further analysis. Another moderate outlier was found to have a significant effect on the normality of the 1800 IOR thin-ideal control condition and was also removed from further analysis. Analysis of multivariate outliers using the Mahalanobis Distance revealed no cases of concern ($p < .001$) that were not deemed legitimate parts of the target population. Following the exclusion of the outliers, all conditions met the assumptions of normality, as assessed by normal-weighted plots, and the Kolmogorov-Smirnov statistic. Levene's test for equality of variance indicated that homogeneity of variance was present for all analyses where applicable, unless otherwise stated.

Sample Characteristics

Following group allocation there were 18 participants with low levels of shape/weight-based self-worth in the accepted condition and 22 in the rejected condition, while there were 27 participants with high levels of shape/weight-based self-worth in the accepted condition and 23 in the rejected condition. Table 5.1 displays the descriptive data for the accepted and rejected conditions within the Low and High groups separately. Independent samples t -tests for the accepted and rejected conditions revealed no significant differences between conditions for age $t(96) = 0.17, p = .863$, BMI $t(96) = -0.62, p = .540$, socially desirable responding $t(96) = -0.50, p = .622$, dietary restraint $t(96) = -1.70, p = .078$, eating concern $t(96) = -1.86, p = .066$, shape concern $t(96) = -1.74, p = .086$, weight concern $t(96) = -1.59, p = .116$, or global eating disorder pathology $t(96) = -1.945, p = .055$. The accepted and rejected conditions showed a trend for differences on the EDE-Q subscales, yet the interaction between Cyberball allocation and Shape/Weight group did not reach significance, Wilks' Lambda = .901, $F(4, 87) = 0.58, p = .090, (\eta^2 = .099)$.

Independent samples *t*-tests examining the descriptive data for the Low and High groups revealed no significant differences between conditions for age $t(88) = 0.31$, $p = .758$, BMI $t(88) = -1.94$, $p = .057$, or socially desirable responding $t(88) = 1.61$, $p = .414$. Comparable to previous samples (e.g., Forsyth, Rieger, & Bell, in press) the High group was significantly higher than the Low group in terms of dietary restraint $t(73.17) = -5.58$, $p < .001$, eating concern $t(61.61) = -7.45$, $p < .001$, shape concern $t(87.18) = -12.11$, $p < .001$, weight concern $t(76.54) = -9.22$, $p < .001$, and global eating disorder pathology $t(71.14) = -14.57$, $p < .001$. Based on these EDE-Q scores in the current sample, the Low group was comparable to the normal population and the High group comparable to a clinical group (Aardoom, Dingemans, Slof Op't Landt, & Van Furth, 2012; Rø, Reas, & Stedal, 2015).

Table 5.1.

Sample Characteristics of the Accepted and Rejected Conditions within the Low and High Groups in Study Three

Characteristic	Low Group		High Group	
	Acceptance	Rejection	Acceptance	Rejection
	(n = 18)	(n = 22)	(n = 27)	(n = 23)
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
Age	18.77 $\pm$ 1.52	19.50 $\pm$ 2.48	19.19 $\pm$ 1.69	18.91 $\pm$ 1.00
BMI	21.21 $\pm$ 2.85	21.49 $\pm$ 1.92	23.09 $\pm$ 2.95	21.40 $\pm$ 1.69
BIDR	12.00 $\pm$ 5.81	11.14 $\pm$ 5.10	10.11 $\pm$ 4.26	9.57 $\pm$ 4.76
Global EDE-Q	0.94 $\pm$ 0.44	0.77 $\pm$ 0.50	2.88 $\pm$ 1.04	2.25 $\pm$ 1.00
Eating Concern	0.37 $\pm$ 0.39	0.40 $\pm$ 0.40	2.04 $\pm$ 1.34	1.35 $\pm$ 0.89
Dietary Restraint	0.67 $\pm$ 0.49	0.49 $\pm$ 0.75	2.04 $\pm$ 1.36	1.48 $\pm$ 1.32
Shape Concern	1.59 $\pm$ 0.80	1.11 $\pm$ 0.69	3.89 $\pm$ 1.00	3.43 $\pm$ 1.12
Weight Concern	1.14 $\pm$ 0.75	1.06 $\pm$ 0.69	3.53 $\pm$ 1.37	2.74 $\pm$ 1.27

Note. BMI = Body Mass Index; BIDR = Balanced Inventory of Desirable Responding; EDE-Q = Eating Disorder Examination-Questionnaire.

Manipulation Check

Table 5.2 shows the analyses conducted to confirm whether the experimental manipulation was successful. First, an independent samples *t*-test was performed to determine whether participants perceived the number of ball tosses to be significantly different across the accepted and rejected conditions. Results indicated that there was a significant difference between conditions, such that participants in the rejected condition correctly perceived that they received the ball fewer times than those in the acceptance condition $t(94) = -16.10, p < .001$.

Table 5.2.

Manipulation Check and State Self-Esteem Measures Across Accepted and Rejected Conditions in Study Three

Item	Acceptance	Rejection	<i>t</i> (df)	Sig.
	Mean $\pm$ SD	Mean $\pm$ SD		
Percentage of throws received?	40.93 $\pm$ 11.84	9.41 $\pm$ 6.72	-15.40 (87)	< .001
To what extent were you included by other participants during the game? ¹	3.84 $\pm$ 0.42	1.78 $\pm$ 0.42	-17.48 (88)	< .001
Did you feel that the other participants excluded you? ¹	1.47 $\pm$ 0.74	4.16 $\pm$ 0.92	3.05 (88)	< .001
Right now I feel displeased with myself ¹	1.62 $\pm$ 0.86	2.16 $\pm$ 1.02	2.68 (88)	.009
Right now I feel good about myself ¹	2.93 $\pm$ 0.94	2.51 $\pm$ 0.99	-2.07 (88)	.041

Note. ¹ Items were answered on a 5-point scale, where 1 = 'not at all' to 5 = 'extremely'.

Independent sample *t*-tests were performed to determine whether the manipulation was successful in inducing feelings of exclusion and lowered self-esteem. Participants in the rejection condition reported significantly lower mean levels of feeling included, and significantly higher mean levels of feeling excluded, compared with those in the acceptance condition. Participants in the rejection condition also reported significantly higher mean levels of feeling displeased with themselves, and significantly lower mean levels of feeling good about themselves, compared with

participants in the acceptance condition. This indicates lower levels of self-esteem in the rejected condition compared with the accepted condition, supporting the effectiveness of the Cyberball task as a rejection manipulation. Additionally there was no interaction between Cyberball group and shape/weight group, Wilks' Lambda = .962, $F(5, 81) = 0.63$, $p = .675$, ($\eta^2 = .038$), indicating that shape and weight based self-worth did not affect how individuals respond to the Cyberball task.

IOR to Non-Thin Body Images

To assess whether the High versus Low groups displayed a difference in IOR towards the non-thin stimuli compared to the control stimuli depending on whether they were accepted or rejected, a four-way, 2 (SOA: 1200ms and 1800ms) x 2 (image: non-thin body image and non-body image) x 2 (shape/weight-based self-worth: Low and High) x 2 (Cyberball condition: accepted and rejected) mixed-design ANOVA on IOR index scores was conducted.

The ANOVA revealed no significant main effects for image type, Wilks' Lambda = .993, $F(1, 83) = 0.61$, $p = .438$, ($\eta^2 = .007$); shape/weight group, $F(1, 83) = 0.02$, $p = .894$, ($\eta^2 = .000$); or Cyberball group $F(1, 83) = 0.04$, $p = .845$, ($\eta^2 = .000$). There was, however, a significant main effect of SOA Wilks' Lambda = .945, $F(1, 83) = 4.88$, $p = .030$, ($\eta^2 = .055$), such that IOR scores were greater at 1200 SOA ($M = 15.83$, $SD = 2.51$) than at 1800 SOA ($M = 10.37$, $SD = 2.10$). There was also a significant two-way interaction between image type and shape/weight group, Wilks' Lambda = .940, $F(1, 83) = 5.27$, $p = .024$, ($\eta^2 = .06$), indicating that IOR indices between the High and Low groups differed across image type. No other two-, three-, or four-way interactions were significant. Figure 5.2 shows the interaction between image type and group on IOR indices. To clarify the nature of this interaction, simple effects analyses were undertaken.

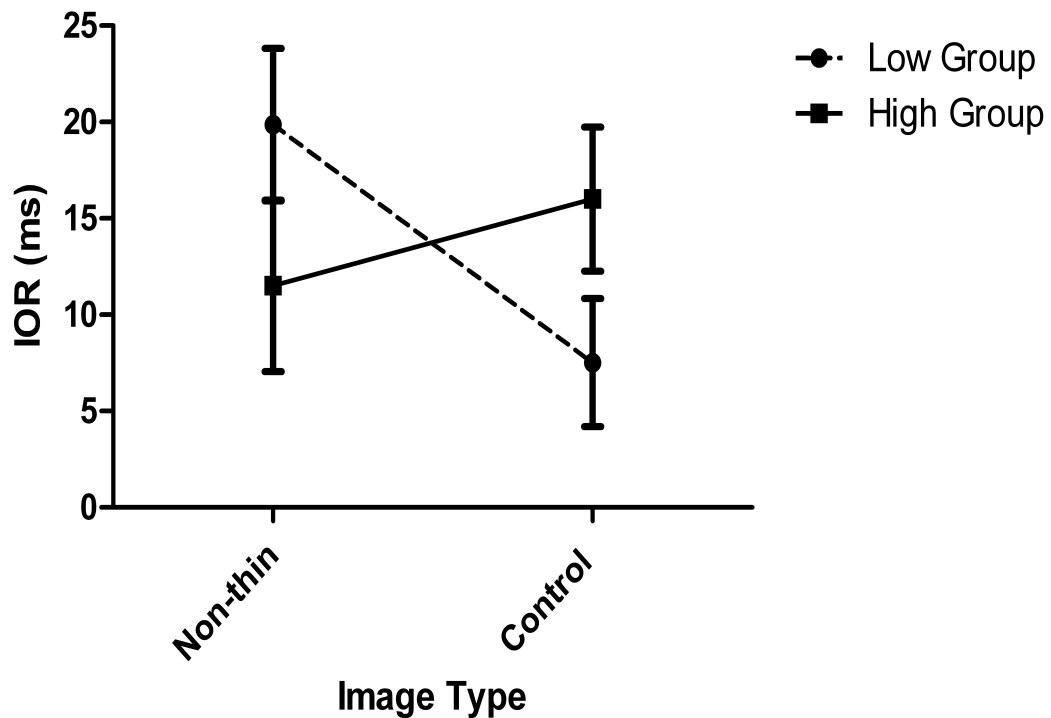


Figure 5.2. Mean IOR index scores (in milliseconds) for the non-thin and control images across the High and Low shape/weight-based self-worth groups. Error bars display +/- one standard error of the mean.

Paired sample *t*-tests revealed a significant difference in IOR for the non-thin body images ($M = 17.18\text{ms}$, $SD = 22.73\text{ms}$) compared to the control images ($M = 8.83\text{ms}$, $SD = 21.75\text{ms}$) in the Low group $t(39) = 2.16$, $p = .037$ (mean difference = 8.35, 95% CI: .521 to 16.179), such that there was significantly greater IOR for the non-thin body images compared to the control images. In contrast, there was no significant difference between the IOR for the non-thin body ($M = 11.16\text{ms}$, $SD = 22.95\text{ms}$) and the control images ($M = 15.67\text{ms}$, $SD = 20.81\text{ms}$) in the High group $t(46) = -1.16$, $p = .253$ (mean difference = -4.51, 95% CI: -12.35 to 3.33).

An independent samples *t*-test revealed no significant difference between the IOR for the non-thin body images in the Low group ($M = 17.18\text{ms}$, $SD = 22.73\text{ms}$) and

the High group ($M = 11.16\text{ms}$, $SD = 22.95\text{ms}$), $t(85) = 1.22$, $p = .224$ (mean difference = -6.015 , 95% CI: -3.76 to 15.79). Further, there was no significant difference in IOR for control images between the Low group ($M = 8.83\text{ms}$, $SD = 21.75\text{ms}$) and the High group ($M = 15.67\text{ms}$, $SD = 20.81\text{ms}$), $t(85) = -1.50$, $p = .138$ (mean difference = -6.845 , 95% CI: -15.93 to 2.24).

IOR to Thin-Ideal Body Images

To assess whether the High versus Low groups displayed a difference in IOR for the thin-ideal stimuli compared to the control stimuli depending on whether they were accepted or rejected, a four-way, 2 (SOA: 1200ms and 1800ms) x 2 (image: thin-ideal body image and control image) x 2 (shape/weight-based self-worth: Low and High) x 2 (Cyberball condition: accepted and rejected) mixed-design ANOVA on IOR index scores was conducted.

The ANOVA revealed no significant main effects for SOA, Wilks' Lambda = .998, $F(1, 83) = 1.40$, $p = .709$, ($\eta^2 = .002$); image type, Wilks' Lambda = 1.00, $F(1, 83) = 0.03$, $p = .869$, ($\eta^2 = .000$); shape/weight group, $F(1, 83) = 0.88$, $p = .351$, ($\eta^2 = .010$); or Cyberball group $F(1, 83) = 1.61$, $p = .207$, ($\eta^2 = .012$). Nor were there any significant two-, three-, or four-way interactions. These results suggest that there was no difference in IOR indices to the thin-ideal compared with control images between the High and Low groups, or between the accepted and rejected groups, across either SOAs.

Discussion

Through utilising a spatial cuing task, measuring IOR, the current study aimed to investigate whether interpersonal rejection would modify attentional biases in individuals who base their self-worth on their shape and weight. Contrary to expectations, interpersonal rejection did not modify attentional biases regarding non-thin or thin-ideal body images in young women with varying levels of shape/weight-

based self-worth. That is, individuals in the High group, who were exposed to an experience of interpersonal rejection, did not display differences in their ability to disengage attention from the non-thin or thin-ideal body images compared with individuals who experienced acceptance or individuals in the Low group who experienced rejection or acceptance.

There was, however, an overall difference between participants with high versus low levels of shape/weight-based self-worth in disengagement of attention for non-thin versus control images, which was unrelated to the experience of interpersonal rejection or acceptance. Specifically, irrespective of interpersonal acceptance or rejection, participants in the Low group displayed increased IOR (i.e., increased disengagement of attention) for the non-thin body images compared to the control images. This pattern of increased disengagement from the non-thin body images, in comparison to the control images, was not present in the High group. The increased disengagement from non-thin body stimuli among individuals who do not base their self-worth on their shape/weight (i.e., the healthy control group) may indicate a protective mechanism against the ongoing attentional processing of non-thin images, which may in turn serve to protect them from developing a fear of weight gain. Since the High group did not display this pattern, they may be at increased risk of over-processing images depicting weight concerns. This is consistent with research in anxiety demonstrating that individuals with low trait anxiety display increased IOR for threatening stimuli, whereby they inhibit the ongoing processing of aversive or distressing material (Waters, Nitz, Craske, & Johnson, 2007). The current results support the prediction that there are differences in how non-thin body images are processed between healthy individuals and individuals at increased risk of eating disorders. This is in contrast to the research by O'Driscoll (2013) who found that body weight contingency of self-worth was not associated with

attentional biases for ‘fat’ words. One explanation for these different findings is the measurement of attention used. While O’Driscoll (2013) assessed biases in the capture of attention, through the use of a visual-probe task, the current study assessed biases in the disengagement of attention with the IOR task. As a result, through the use of two different attentional tasks, the two studies were assessing different components of attentional biases, proposed to be related to different stages of information processing (Cisler & Koster, 2010). In combination, the findings from these studies suggest that differences in the processing of non-thin stimuli may be especially present at the attentional maintenance stage rather than during attentional capture.

In contrast to the group difference in IOR for non-thin stimuli in the present study, there were no significant differences between the High and Low groups in the processing of the thin-ideal stimuli. One possible explanation for this result is that the non-thin bodies may have been perceived as more aversive than the thin bodies. The pervasive nature of obesity stigma (Puhl & Brownell, 2001) may result in an increased salience of concerns related to obesity in individuals who base their self-worth on their shape and weight. Moreover, due to the significant negative connotations associated with being obese (Puhl & Brownell, 2003), issues relating to obesity are likely to involve a perception of threat. This perception of threat may contribute to changes in attentional processing of non-thin information, but not for thin information, this is comparable to the results obtained in the processing of threat-related stimuli in anxiety (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; MacLeod & Mathews, 1988).

The current study did not find a significant impact of rejection on attentional biases, similar to the non-significant findings reported by O’Driscoll (2013). This stands in contrast to the findings on attentional bias using the Cyberball task and

visual-probe paradigm in a study by Rieger et al. (2017). Specifically, this study found that, in response to an experience of rejection, individuals with high shape/weight-based self-worth showed reduced avoidance of thin-ideal body images, compared with individuals who did not base their self-worth on their shape and weight. As the only difference between the two studies was the attentional task used, this suggests that an immediate experience of acceptance versus rejection may affect earlier stages of attentional processing, such as attentional capture as measured through the visual-probe paradigm, but does not maintain its influence over later stages of attentional processing, such as attentional maintenance as measured through the spatial cuing task. Through the use of two different attentional tasks, the present study and the study conducted by Rieger et al. (2017) are assessing different components of attentional biases, proposed to be related to different stages of information processing (Cisler & Koster, 2010). As these tasks are measuring different stages of attention, these stages of attention may be differentially influenced by experiences of ostracism, or other state changes (Fox et al., 2002; Xu et al., 2015). Therefore, while being speculative, one possibility is that biases in attentional maintenance may be relatively stable, even in the face of stressful events, including changes to self-esteem.

Another possible explanation is that the interpersonal rejection manipulation used may not have been sufficiently strong, targeted or ecologically valid to reduce self-esteem and body-esteem in order to alter attentional maintenance processes. While the results revealed lower mean levels of self-esteem in the rejection condition compared to the acceptance condition, this may not have lowered body-esteem, which may be necessary to modify attention towards body imagery. Therefore, it would be worth investigating an alternate manipulation of interpersonal rejection, such as utilising a

paradigm directly related to rejection on the basis of shape/weight (Benas & Gibb, 2008; Keery, Boutelle, van den Berg, & Thompson, 2005; Neumark-Sztainer et al., 2002).

In addition to possible limitations in the rejection manipulation utilised in the current study, the findings need to be interpreted in light of a number of other methodological considerations. Firstly, the current study did not assess participants' levels of rejection sensitivity, that is, the tendency to anticipate rejection and interpret neutral situations as indicative of rejection (Downey & Feldman, 1996). This tendency to be biased towards expecting negative evaluation by others may have impacted the results of the current study. Rejection sensitivity has been found to be associated with biased attentional processing of socially threatening stimuli (Tanaka & Ikegami, 2015), whereby following an experience of exclusion, individuals with high levels of fear of negative evaluation displayed increased selective attention towards signals of social threat (such as angry faces) compared to signals of social acceptance. The reverse was found for individuals low on fear of negative evaluation (Tanaka & Ikegami, 2015). As rejection sensitivity was not measured and controlled for in the present study, it is possible that it masked differences in attentional biases between the Low and High groups who experienced acceptance or rejection.

Secondly, as previously stated, the later stage of attention (i.e., attentional disengagement) assessed in the present study may have affected the results in that this later stage of attention may not be as susceptible to state changes in self-esteem. In the field of anxiety, Verkuil et al. (2009) found that impaired disengagement was not associated with state anxiety, whereas other research has found that changes to state anxiety affect disengagement of attention from threatening stimuli (Fox et al., 2002; Xu et al., 2015). Further research is thus needed to clarify if state changes in self-esteem as

a result of interpersonal rejection impact attentional biases to body stimuli at different stages of attention.

Finally, the stimuli selected for use in the current study may have not have been aversive enough to trigger individuals' shape/weight schemas. While the current research used non-thin stimuli, depicting a BMI of approximately 26, previous research has utilised words or pictures to denote more overweight or obese body types (Rieger et al., 1998; Shafran et al., 2007). Therefore, a possible explanation for the lack of findings in the High group may have been due to the images not being interpreted as negative enough to activate their body shape/weight schema. It would be warranted then, to investigate the effects of interpersonal rejection and disengagement of attention from more negatively perceived body images.

In summary, the present study found that interpersonal rejection versus acceptance did not result in differences in the ability to disengage attention from thin-ideal or non-thin body images. Irrespective of interpersonal rejection or acceptance, individuals with low levels of shape/weight-based self-worth alone displayed increased disengagement of attention for non-thin ideal body images compared to control images. This may suggest the presence of a protective mechanism in healthy individuals, which serves to inhibit the deleterious, ongoing processing of non-thin ideal body imagery.

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Chapter Six. General Discussion

The present research program focused on further understanding cognitive biases associated with shape/weight-based self-worth. This construct is proposed to be a key component of body image disturbance and the core cognitive psychopathology of eating disorders, while also being theorised to be related to the development and maintenance of these problems (Fairburn, Cooper, & Shafran, 2003). Given the widespread prevalence and significant consequences associated with body image disturbance and eating disorders (Cash & Hicks, 1990; Mond et al., 2013; Rodin, Silberstein, & Striegel-Moore, 1984), there is a noteworthy health and social need to increase knowledge about the factors that contribute to their development and maintenance so as to refine theoretical models and help guide the development of more effective prevention and treatment approaches.

Cognitive models of body image disturbance and eating disorders assert that shape/weight-based self-worth is a result of a dysfunctional schema that unites beliefs about personal value with beliefs about shape and weight. Individuals who possess this schema are predicted to process body information differently than individuals without it. The cognitive biases that result from this schema are proposed to drive the development and maintenance of body image concerns and disordered eating behaviours (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999a; Vitousek & Hollon, 1990; Williamson, Stewart, White, & York-Crowe, 2002). Informed by these models, the present research program focused on exploring one aspect of information processing related to this schema, namely, attentional biases regarding body information. The overall aim of the research program was to increase understanding of body image disturbance and eating disorders through investigating whether individuals with elevated shape/weight-based self-worth display attentional biases in processing body information.

More specifically, the current program of research sought to provide some clarification regarding the inconsistencies characterising the large body of empirical work investigating attentional biases for body information (for reviews, see Dobson & Dozois, 2004; Faunce, 2002; Lee & Shafran, 2004). A number of methodological factors may have contributed to these discrepant findings, including differences in the components of attention measured (i.e., capture, avoidance or maintenance), differences in the criteria used to characterise groups (e.g., body dissatisfaction or dietary restraint), and differences in the types of stimuli used (e.g., words versus images). In addition, situational factors that may impact on attentional biases (such as interpersonal rejection) remain largely unexplored.

Summary of the Present Findings

Accordingly, the first aim of the present research program was to more clearly focus on just one component of attention by investigating the maintenance of attention for thin-ideal and non-thin body stimuli using a spatial cueing task (Posner, 1980) measuring Inhibition of Return (IOR), also referred to as an IOR task. The IOR task has been applied to examine differences in the disengagement of attention from emotionally- or motivationally-relevant stimuli in other clinical fields such as anxiety (Verkuil, Brosschot, Putman, & Thayer, 2009), depression (Dai & Feng, 2009; Koster, De Raedt, Goeleven, Franck, & Crombez, 2005), and obesity (Carters, Rieger, & Bell, 2015). The second aim of the research program was to assess these attentional biases in young women with high or low levels of shape/weight-based self-worth given the primacy of this individual difference variable in conceptualisations of body image disturbance and eating disorders. Based on the aforementioned cognitive models, it was predicted that young women with high levels of shape/weight-based self-worth would display differences in IOR

for both non-thin and thin-ideal images compared to the control images.

In partial support of this hypothesis, the results revealed a difference in disengagement of attention from body images between individuals with high or low levels of shape/weight-based self-worth. The key finding from Study One and Study Three was that individuals with low levels of shape/weight-based self-worth displayed increased disengagement of attention from non-thin body images compared with the control images, and that this differential pattern of attentional disengagement was not present in individuals with high shape/weight-based self-worth. This result may indicate that body images present in everyday life impact healthy individuals differently than individuals with shape/weight-based self-worth, in that the former may maintain their attention less to this information. Being able to attend less to non-thin body information may be a protective factor against ongoing preoccupation with body images that trigger negative affective states such as fear of fat. 'Feeling fat' is a common experience among women in general, but especially so for women highly concerned with their shape and weight, such as individuals with eating disorders. Feeling fat is associated with a number of pathological consequences including negative distress, negative emotions, and negative self-beliefs (M. J. Cooper, Deepak, Grocutt, & Bailey, 2007). Fears of potential weight gain and 'feeling fat' rather than the actual presence of body fat are associated with engaging in unhealthy eating and exercise behaviours (Windram-Geddes, 2013). As a result, increased disengagement of attention from non-thin images in individuals who do not base their self-worth on their shape and weight may result in these individuals being less vulnerable to experiencing such states as 'feeling fat', thus protecting them against its potentially harmful consequences. The High group did not display this differential pattern of attention; rather, they returned their attention

to the non-thin body images as readily as they did to the control images. The findings in the Low group are consistent with research demonstrating that individuals with low trait anxiety display increased IOR for threatening information, which has been interpreted as reflecting an adaptive emotion regulation strategy possessed by healthy individuals when presented with threatening information (Sagiano, Trojano, Amoriello, Miglizzo, & D'Olimpio, 2014; Waters, Nitz, Craske, & Johnson, 2007).

The third aim of the present research was to extend the investigation of attentional maintenance for non-thin and thin body stimuli in young women with high and low levels of shape/weight-based self-worth by also examining these associations for body words (in addition to images). Participants in Study Two were again young women with differing levels of shape/weight-based self-worth. Based on the cognitive models, it was again predicted that individuals with high levels of shape/weight-based self-worth would display differences in IOR for both the non-thin and thin words compared to the control words.

In partial support of this hypothesis, the results revealed that there were differences in the disengagement of attention from body words, but not control words, between individuals with high or low levels of shape/weight-based self-worth. The key finding for Study Two was that, similar to the results for the images, participants with low shape/weight-based self-worth alone displayed differences in IOR, whereby there was reduced IOR for the non-thin body words compared to the control words. This pattern of *reduced* IOR from the non-thin body words compared with the control words stands in contrast to the results on the processing of images in Study One and Three where there was *increased* IOR.

In combination, the results from Study One and Three on images and from Study Two on words suggest a different pattern of attentional maintenance for non-thin body information depending on the type of stimuli used. These differences could be due to differences in the complexity of stimuli, which would result in the IOR tasks measuring different time courses of attention. Specifically, as IOR starts later for more complex stimuli such as images (Klein, 2000), the reduced IOR seen for the non-thin words in the Low group may reflect faster disengagement of attention, followed by earlier onset and decay of IOR. In this way, the current results for the words would actually be consistent with the increased disengagement of attention from the non-thin images seen in the Low group. However, due to the SOAs used in the current research program, this interpretation remains speculative.

However, another interpretation of the different patterns of IOR for the images and words could be due to differences in analytical versus affective processing of this information. The differences between words and pictorial stimuli may be related to picture cues being more ecologically valid and/or eliciting more of an affective response than words, and therefore being processed in different systems (DeHouwer & Hermans, 1994). It is proposed that pictorial stimuli are processed in the semantic system where affective information is stored, while words are processed in the lexical system (Glaser & Glaser 1989). Research by DeHouwer and Hermans (1994) supported this prediction in demonstrating that pictorial cues access a semantic system influenced by affective information, which is not accessed by words. These results indicated different patterns of attentional biases dependent on the stimulus type used. This differential pattern has also been found for food words versus images (Freijy, Mullan, & Sharpe, 2014), which were again proposed to reflect the operation of more affective-based processing of images

versus more analytic-based processing of words (Hinojosa, Carretié, Valcárcel, Méndez-Bértolo, & Pozo, 2009). Thus, while reducing attention to non-thin images may provide an adaptive mechanism in healthy individuals, as it may reduce the affective distress known to trigger disordered eating behaviour (Stice, Nemeroff, & Shaw, 1996; Stice, Shaw, & Nemeroff, 1998), increased attentional maintenance for non-thin words may be an adaptive mechanism if it encourages an awareness of the consequences of not engaging in healthy weight control behaviours. This potential differing pattern of attentional bias highlights the importance of considering the type of stimulus used when interpreting the diverse results from the existing body of research.

The fourth aim of the present program of research was to investigate the effects of interpersonal rejection on attentional biases in young women with high and low levels of shape/weight-based self-worth. Through employing an unambiguous measure of interpersonal rejection - namely, the Cyberball task (Williams, Cheung, & Choi, 2000) - the current research built on previous studies investigating the role of interpersonal rejection in the development of body image disturbance and eating disorder symptoms, extending this to include attentional biases. Based on the interpersonal models of eating disorders (Rieger et al., 2010), it was predicted that individuals with high versus low levels of shape/weight-based self-worth would display differences in IOR for both the non-thin and thin-ideal images compared to control images, following an experience of interpersonal rejection versus acceptance.

The key finding of Study Three was that despite inducing feelings of rejection and lowered self-esteem, the Cyberball task did not modify IOR for non-thin or thin-ideal images in participants with varying levels of shape/weight-based

self-worth. While there were no differences in IOR between the accepted and rejected conditions, overall participants with low shape/weight-based self-worth did demonstrate increased IOR (i.e., increased disengagement of attention) for non-thin body images compared with the control images, as previously discussed.

These results further support the findings in Study One, and also indicate that biases in attentional maintenance may not be affected by an immediate change to mood or experiences of social rejection. This stands in contrast to the findings on attentional bias using the visual-probe paradigm (Rieger, Dolan, Thomas, & Bell, 2017). In this study, in response to an experience of interpersonal rejection, individuals who based their self-worth on their shape and weight demonstrated reduced avoidance of thin-ideal body images, compared with individuals who did not base their self-worth on their shape and weight. This suggests that immediate experiences of acceptance versus rejection affect earlier stages of attentional processing, such as attentional capture as measured through the visual-probe paradigm, but may have less of an impact on later stages of attentional processing, such as attentional maintenance as measured through the spatial cuing task.

Theoretical and Clinical Implications of the Current Research Findings

Theoretical implications. The main findings of the present research program have potential implications for cognitive theories as well as the prevention and treatment of body image disturbance and eating disorders. Cognitive models of body image disturbance and eating disorders consistently posit that individuals preferentially process information related to their self-body schema, such as body-related information (Thompson et al., 1999a; Vitousek & Hollon, 1990; Williamson et al., 2002), yet the exact nature of these biases is unclear. The fields of anxiety and depression have demonstrated the value in understanding the nature of the attentional bias, such as

which components are systematically biased and in regards to what information, rather than simply determining the presence of an attentional bias (Mogg & Bradley, 1998). In comparison, the body image and eating disorders literature is characterised by notably less focus on differentiating the components of attentional biases, and as such the models are underdeveloped in this regard.

The results of the current research program support Vitousek and Hollon's (1990) model that individuals with a shape/weight schema will display differences in processing shape/weight information, at least for non-thin information. Thompson et al.'s (1999a) cognitive processing model predicts that individuals with a highly developed shape and weight schema will display attentional biases in processing shape and weight words due to the presence of a 'mental encyclopedia'. The 'mental encyclopedia' contains shape and weight words which are endowed with emotionally laden meanings. The current results demonstrating attentional biases in words, support the hypothesis that the meanings contained within an individual's 'mental encyclopedia' impact their ability to process non-thin shape/weight words compared to individuals without this schema. The current results also expand this model to indicate that differences in attentional biases existed for both images and words, but they may need to be understood through different mechanisms. The current results also support and expand Williamson et al.'s (2002) prediction that while some cognitive biases are labile in response to negative emotion, others are stable. This model hypothesised that while some cognitive biases, such as body size estimation, may fluctuate in response to increased negative affect, other cognitive biases, such as attention, remain more stable regardless of changes in mood. The results of the current research program demonstrating that attentional biases were not affected by immediate changes to self-esteem support this prediction, at least for

the later stage of attentional processing (i.e., the disengagement of attention). These results, in combination with previous findings demonstrating that attentional capture was affected by changes to self-esteem (Rieger et al., 2017), suggest further refinement to this model to indicate that while the initial stages of attention may be labile, the later stages may be more stable across mood states. Overall, the current results support and suggest refinements for the existing cognitive models of body image and eating disorders in terms of the nature of the information (verbal versus visual) and which components of attention are affected by situational and affective processes.

The current results further contribute to the existing cognitive models by suggesting differences in later stages of attention (i.e., attentional maintenance) between young women with varying levels of shape/weight-based self-worth. More specifically, young women with high levels of shape/weight-based self-worth were found to lack the potential protective mechanism evident in those with low levels of this construct in processing both non-thin images and words. Existing research indicates that individuals with eating disorder psychopathology display differences in the initial capture of attention (Jiang & Vartanian, 2017). The present results suggest that there may also be differences in the maintenance of attention.

Understanding which components of attention are biased has been an important development within the anxiety literature as it further elucidates how threatening stimuli impact individuals with anxiety disorders, and provides some understanding about how these disorders are maintained. Reductions in the disengagement of attention have been proposed to result in greater negative affect following the presentation of distressing stimuli (Amir, Elias, Klumpp, & Przeworski, 2003; Fox, Russo, Bowles, & Dutton, 2001; Fox, Russo, & Dutton, 2002; Yiend & Mathews,

2001). Therefore, a reduced ability to disengage attention from non-thin body images (as found in the present research) may also result in greater negative affect in individuals with elevated shape/weight-based self-worth. These individuals may also be more likely to maintain their attention on these disorder relevant stimuli at the cost of not attending to other, potentially more functional information in their environment. The finding that individuals with high levels of shape/weight-based self-worth display less disengagement of attention from non-thin images compared to individuals without this schema, and no difference in the disengagement of attention from non-thin body images compared with control images, suggests that when presented with both sets of information they are at greater risk of becoming preoccupied with the non-thin information.

As well as informing theoretical perspectives regarding the stage of attentional processing, the current findings have implications for theory-building in terms of the processing of thin versus non-thin body stimuli. The existing models predict that attention will be preferentially allocated to schema-relevant information (Thompson et al., 1999a; Vitousek & Hollon, 1990; Williamson et al., 2002), yet it is unclear how this differentially relates to non-thin and thin body information, and whether or not there will be any differences between the two. While the current results found little evidence of biases in attentional maintenance for thin information between those with varying levels of shape/weight-based self-worth, there were differences across all three studies in the processing of non-thin information. These results highlight, at least for the later stages of attention, that differences in attentional biases were more apparent for non-thin body information. This contrasts with some research using the visual-probe paradigm that has found differences for thin rather than non-thin stimuli (Dondzilo, Rieger, Palermo, Byrne, & Bell, 2017).

The study by Dondzilo et al. (2017) found that increased attentional capture (vigilance) for thin-ideal body images was associated with greater body dissatisfaction, dietary restraint, which was mediated by eating disorder specific rumination. This study also demonstrated a relationship between both body dissatisfaction and dietary restraint and avoidance of non-thin stimuli. These results, in combination with the results found in the current body of research, suggest differential patterns of attention for thin versus non-thin information dependent on stage of attentional processing. For instance, the increased capture for thin images demonstrated by Dondzilo et al. (2017) could indicate a vulnerability to attentional capture for thin information that could increase an individual's attempts to achieve a thinner physique by encouraging the belief that thinness is attainable. Conversely, attentional maintenance regarding non-thin body images may have implications for driving fat feelings and the fear of weight gain frequently exhibited in individuals with eating disorders and body image disturbance. Therefore, different patterns of attentional biases either towards or away from thin and non-thin body information could contribute through diverse pathways to the development and maintenance of eating disorder attitudes and behaviours. Overall, the accruing field of research examining thin versus non-thin stimuli should be used to inform refinements to existing cognitive models.

The current results further contribute to the development of cognitive models by uncovering attentional biases in healthy individuals. As such, they contribute to calls emanating from positive psychology to expand theory and research beyond a focus on pathological processes to examine the factors associated with resilience. Rather than focusing on the presence of psychopathology, positive psychology encourages an understanding of the factors that help people adapt to stressful

experiences more efficiently and effectively (Tugade & Fredrickson, 2004).

Through understanding the factors associated with resilience, the current research highlights the importance of understanding and building protective or adaptive mechanisms which may help individuals to engage in more effective coping behaviours which shield against potentially negative life experiences in a body saturated media environment.

While cognitive models predict that it is individuals with a self-body schema who will display differences in the processing body-related information, the current results suggest the operation of a protective mechanism among individuals without a pronounced self-body schema. That is, it was individuals who did not base their self-worth on their shape and weight who displayed differential patterns of attention for the non-thin body versus control images and words. These results were taken to reflect adaptive mechanisms that inhibit the ongoing processing of affective-based information (i.e., non-thin images), and which could promote engagement in health-related information (i.e., non-thin words). This suggests that current theories need to consider the potentially adaptive role of attentional biases in protecting individuals from maladaptive responses regarding their bodies, rather than only considering attentional biases to be pathological.

Clinical implications. The current findings of differences in attentional maintenance for non-thin body stimuli in healthy relative to at-risk individuals demonstrated in this research program may also have important clinical implications for the prevention and treatment of body images issues and eating disorders. Perhaps most importantly, the results suggest that interventions for body image disturbance and eating disorders could be improved through the addition of interventions designed to modify disengagement of attention. Cognitive behaviour therapy (CBT) is a leading evidence

based treatment for individuals with body image disturbance (Cash & Lavalley, 1997; Fisher & Thompson, 1994) and eating disorders (Z. Cooper & Shafran, 2008; Fairburn et al., 2003). In general, it involves psychoeducation, cognitive restructuring, and behavioural experiments (Fairburn, 2008), with some of these strategies attempting to modify attentional biases to body information indirectly (Shafran, Lee, Cooper, Palmer, & Fairburn, 2008). For example, behavioural strategies such as exposure are used to reduce body avoidance, whereby an individual actively attends to disliked body parts, with the goal of modifying attentional avoidance of these body parts. Alternatively, excessive body checking is addressed through the use of distraction and refocusing strategies, whereby an individual reduces their attention regarding these parts of their body. If attentional biases prove to be an important component maintaining an individual's self-body image schema and its maladaptive consequences, then it would be beneficial to target attentional biases more directly, including attentional maintenance processes.

As the current results indicate that healthy individuals have increased disengagement from non-thin images, enhancing this potentially protective mechanism should be considered in treatment. Strategies to help individuals direct their attention away from non-thin images may help reduce a preoccupation of fear of fat in individuals with body image concerns. Such strategies may include mindfulness techniques (e.g., noticing and letting go of thoughts) or behavioural techniques for combatting rumination (e.g., planned distraction techniques). These strategies may help individuals to direct attention away from excessive and prolonged processing of body cues.

A potential limitation of these strategies is that they require a level of conscious processing and thus may be impacted by deliberate avoidance of

participating in these therapeutic strategies on the part of the individual (Renwick, Campbell, & Schmidt, 2013). Thus, beyond the use of these additional strategies to CBT, attentional training interventions that directly attempt to change attentional biases may help to overcome deliberate avoidance (Renwick et al., 2013).

Attentional training interventions were developed from research into the role of attentional biases in maintaining symptoms in anxiety. Attentional training may be an important part of treatment for individuals with eating disorder symptoms given that attentional biases can persist into recovery (Cardi, Matteo, Corfield, & Treasure, 2013). Through directly modifying attentional biases, these interventions are thought to modify immediate stress responses and result in more attentional control (Renwick et al., 2013). One such intervention is the Attention Training Technique, designed to improve attentional control and flexibility (Wells, 2007), which has been successfully used to alter selective attention in depression and anxiety (Papageorgiou & Wells, 1998, 2000), and could therefore be used in an attempt to increase disengagement of attention from bodies.

Cognitive remediation therapy is another approach that could be used to improve attentional abilities, including flexibility and set-shifting. It has been shown to help individuals to focus attention away from specific content in anorexia nervosa (Tchanturia, Lloyd, & Lang, 2013), depression (Bowie, Gupta, & Holshausen, 2013), and schizophrenia (Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). Therefore the application of this approach to help improve attentional processing of non-thin body information warrants consideration.

The different patterns of attentional disengagement for images and words, with the suggestion that images are processed more affectively and words more analytically, may provide important insights into the need to target this in treatment.

The proposed differences in affective processing of images and analytical processing of words shares similarities with the distinction that has been made between hot and cold cognitive processes. Cold cognitions relate to information processing in the absence of emotion, while hot cognitions relate to emotional laden/driven information processing (Roiser & Sahakian, 2013). Impairments in cold cognitions and difficulties regulating hot cognitions are frequently observed in psychopathology, including depression (Roiser & Sahkian, 2013) and eating disorders (Davies et al., 2012). Therefore, a common target of psychological therapy for these disorders, such as cognitive therapy, is to train individuals to exert cold cognitive control over their hot cognitions. Being able to exert cold cognitive control over hot cognitions results in better inhibition of the impact of negative information (Roiser & Sahkian, 2013). The results of the current research provide some support for this approach in finding that individuals who do not base their self-worth on their shape and weight (i.e., healthy individuals) favour the ongoing processing of non-thin body over control words while minimising the processing of non-thin body over control images. As such they demonstrate more analytical or greater use of cold cognitive processes, and less use of more affective or hot cognitive processes, which could be an adaptive emotion regulation strategy. This suggests that individuals who base their self-worth on their shape and weight could benefit from training to exert greater cold cognitive control in the processing of non-thin body information, and less hot cognitive processes. Such an interpretation supports a focus on hot versus cold cognitive processes in individuals with body image disturbance and eating disorders. One such treatment approach is Cognitive Remediation and Emotion Skills Training (CREST; Tchanturia, Doris, Mountford, & Fleming, 2015). CREST aims to target distorted thinking and teach emotion regulation skills (Davies et al.,

2012). Research has supported the effectiveness of the CREST program in improving cold cognitions (Davies et al., 2012), and improved symptom outcomes in anorexia nervosa (Tchanturia et al., 2015).

Strengths and Limitations of the Present Research and Future Directions

Strengths. The present research program has a number of noteworthy strengths. Firstly, it used a complimentary cognitive paradigm, IOR, to investigate attentional bias to body cues, thereby applying a paradigm that is relatively novel in this context but that has been previously shown to be a sensitive measure of attentional maintenance in other clinical applications. This enabled the current research to build on previous research utilising the visual-probe task, and attempt to overcome limitations surrounding differentiating attentional capture versus the disengagement of attention (Aspen, Darcy, & Lock, 2013; Jiang & Vartanian, 2017).

A second strength of the research program was that participants were categorised on their level of shape/weight-based self-worth, theorised to be a primary component of body image disturbance and the core cognitive psychopathology of eating disorders (Fairburn et al., 2003). It is also at the heart of the cognitive models that theorise the operation of attentional biases stemming from the self-body schema. Thus the current research was able to investigate whether individuals who possess this schema, regardless of whether or not it has resulted in a clinical eating disorder, display differences in attentional biases. This construct has been neglected in previous research, which has largely focused on body dissatisfaction, despite body dissatisfaction being normative in the general population (Rodin et al., 1984). The central role of this schema in body image and eating disorders and its proposed role in the maintenance of eating disorder symptoms, underscores the importance of understanding whether or not it is

associated with attentional biases regarding body information.

Another strength of the research program was attempts to ensure that the body and non-body images sets were both matched with control stimuli in terms of perceived valence and arousal, through pilot work. This was done to reduce the possibility of detecting attentional biases due to differences in the perceived emotionality (rather than the content) of the stimuli (Fox et al., 2002).

Limitations. There are, however, also several limitations in the present research program that need to be considered when interpreting the findings. Firstly, there are a number of limitations due to the sample used. A university sample of young women was recruited for all three studies. While research indicates that body images concerns are highest in young women (Stice, 2002), the restricted sample may limit the generalisability of the findings to broader community samples in terms of age, gender, ethnicity, and education. For example, individuals' experiences of body image change with age (Lewis & Cachelin, 2001; Tiggemann, 2004), where due to changing life priorities, physiological and psychological factors, there is reduced internalisation of the thin-ideal and fear of fatness (Kilpela, Becker, Wesley, & Stewart, 2015), such that it would be worthwhile investigating whether the present results vary across women of different age groups. Further, the current research was limited to exclusively female participants. Males are also affected by body image concerns (Cash, Morrow, Hrabosky, & Perry, 2004), though these more typically relate to the muscular ideal rather than the thin-ideal (Cafri et al., 2005). As such, additional research could aim to investigate differences in attentional biases regarding muscularity-oriented stimuli in males with different levels of body image concerns.

Finally, another important consideration is how attentional biases may vary as a function of ethnicity and different cultural standards of beauty. Preliminary

research suggests that there are different patterns of attentional biases regarding body stimuli depending on culture (Chen & Jackson, 2005). Using a similar paradigm investigating attentional biases in a sample of young Chinese women, Gao et al., (2013) found that women with higher levels of weight dissatisfaction displayed reduced disengagement from non-thin body images. While their results are comparable to the current findings, future research including a comparison sample of Caucasian and Chinese women should investigate whether cultural differences in attentional disengagement for thin-ideal and non-thin body stimuli exist.

Relatedly, while the current results provide insight into possible attentional biases in individuals with elevated levels of shape/weight-based self-worth, care should be taken when extrapolating from these results to individuals with eating disorders, given research indicating differential patterns of attention in those with clinical levels of eating disorder symptomatology versus those at risk for eating disorders. For example, a study by Rieger et al. (1998) found a different pattern for the clinical and non-clinical high restraint participants, whereby individuals with eating disorders directed attention away from thin stimuli and towards non-thin stimuli but this pattern was not observed for non-clinical participants with levels of dietary restraint. Therefore a question remains as to whether individuals with eating disorders would demonstrate differential patterns of attentional maintenance for these stimuli. While no differences in attentional biases for the thin information were found in the current research, a question remains as to whether individuals with a diagnosed eating disorder demonstrate attentional biases to thin-ideal stimuli, which would encourage the ongoing pursuit of dieting. Thus employing the current paradigm with a sample of individuals diagnosed with an eating disorder would be a

fruitful line of future research.

Another consideration of the current sample is that although the sample sizes were equivalent, if not slightly larger, than similar studies on attentional biases to body stimuli (Aspen et al., 2013; Gao et al., 2013; Gao et al., 2011; Rieger et al., 1998), a larger sample would have increased the power of the current studies. Future studies should therefore aim to obtain a larger sample, recruited across the community, to provide a more powerful investigation of attentional biases to body images and words. Another set of limitations relates to the assessment measure utilised to determine participants' levels of shape/weight-based self-worth. Two items from the EDE-Q were used to categorise individuals in the High or Low groups. Specifically, participants were allocated to the Low group if they scored 0-2 (*not at all*, to *slightly*) or, the High group if they scored 4-6 (*moderately* to *markedly*) on either of the following EDE-Q items: "Over the past 28 days, has your shape/weight influenced how you think about (judge) yourself as a person?" The use of these questions to determine the level of shape/weight-based self-worth may have impacted the accuracy of group categorisation for several reasons. Firstly, self-report data is limited by individuals' levels of awareness and honesty, and influenced by factors such as social desirability bias (Ellingson, Smith, & Sackett, 2001; Paulhus, 1991). As such, individuals are required to have a level of insight and honesty in reporting their level of shape/weight-based self-worth. Future research could use the Eating Disorder Examination (EDE) interview as this would enable the researcher to gain further clarification, which may result in a more accurate classification of groups. Another limitation of the use of the EDE-Q is that it may not be directly assessing the self-body schema. Cognitive models of eating disorders propose that attentional biases stem from dysfunctional schema about shape and weight, yet the

EDE-Q is not a direct measure of this schema. Therefore the use of these two items provides an indirect indication of the presence of this schema. As such, it is difficult to know whether the findings of the current research are specific to levels of shape/weight-based self-worth rather than individual's differences on eating disorder symptomatology more generally. Future research investigating differences in attention in individuals with varying levels of this schema may benefit from considering alternative, more direct schema measures, such as the eating disorder version of the sentence completion task (Rawal, Park, & Williams, 2010).

An additional consideration pertains to limitations with the use of the IOR task. The IOR task used in all three studies measured attention at two set points in time (1200ms and 1800ms after stimulus onset). As a result, the current results provide no information about attentional processing outside of these time points. Thus it cannot be determined, for example, what happens either at earlier stages of attention (i.e., orienting), or in between these two time points (i.e., multiple engagements and disengagements). As the IOR paradigm only sampled two points in time, it is conceivable that the current research may have missed some potentially meaningful information about changes in cognitive biases over time.

A further limitation is related to the thin and non-thin stimuli used in all three studies. While initial pilot data was gathered regarding the valence and arousal of these images, no ratings were obtained in terms of their attractiveness. As such, it is possible that features other than the thinness of these images (e.g., attractiveness of clothing) might have influenced attentional bias. Future research would therefore benefit from investigating whether attractiveness influences attentional biases regarding thin versus non-thin images.

Additionally, while the current stimulus presentation durations were intended

to measure attentional maintenance, there remain questions around the stimulus presentation times that measure the different components of attention (Koster, Crombez, Van Damme, Verschuere, & De Houwer, 2004; Koster, Crombez, Verschuere, Van Damme, & Wiersema, 2006; Yiend & Mathews, 2001). While the initial orienting of attention can be measured with presentations around 200ms (Field & Cox, 2008), the disengagement of attention typically requires another 150ms (Theeuwes, 2005). While most current research suggests that 500ms represents attentional maintenance (Koster, Crombez, Verschuere, & De Houwer, 2004), it is not well understood how the complexity of the stimuli influences the time course of attention. As the images presented in Study One and Study Three could be considered more complex than the words presented in Study Two, these studies may be assessing attentional biases over different time points. Therefore, the time-course of attentional biases measured through various paradigms using different stimulus types remains an important question. The inclusion of concurrent eye-tracking with behavioural tasks such as the IOR task would provide continuous information on the direction of overt attention to help answer such questions (Jiang & Vartanian, 2017).

Future research directions. In addition to those already mentioned, there are a number of future research directions that are important to further the current understanding of attentional biases in the body image and eating disorders context. Firstly, other variables need to be investigated as potential moderators of biases in attentional maintenance regarding non-thin and thin body stimuli. Shape/weight-based self-worth is highly correlated with other aspects of eating disorder symptomatology (M. J. Cooper, 1997; Fairburn & Harrison, 2003) and general psychopathology (e.g., anxiety and depression), and therefore these factors may have also contributed to the

current group differences in attentional bias (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999b). For instance, some of these factors, such as negative mood, have been shown to influence attention to self-identified ‘ugly’ body parts in female adolescents with anorexia nervosa (Svaldi et al., 2016). As such, future studies would benefit from attempts to distinguish between these related variables by, for example, including additional groups with elevated levels of depression or anxiety in the absence of elevated shape/weight-based self-worth, or groups with elevated shape/weight-based self-worth with and without comorbid mood disorders.

In addition to these moderators, of interest is to investigate the consequences of the attentional patterns on eating disorder symptoms. Research using an attentional priming paradigm demonstrated that priming to thin-ideal images resulted in attentional biases towards thin body words and poorer body image (Lane, Mulgrew, Mahar, White, & Loughnan, 2017). Similar research could be done with the spatial cuing task to train attention towards or away from non-thin stimuli, and investigate the associated consequences of inducing these biases in attentional maintenance on body dissatisfaction and dieting behaviours.

Finally, future research could investigate whether attentional maintenance biases could be modified through training. If it is the case that healthy individuals possess adaptive mechanisms, such as increased disengagement from non-thin body images, then the IOR task could be explored as a method of attention retraining. Other cognitive tasks such as the visual-probe task have been used to modify cognitive biases in other areas such as anxiety and body dissatisfaction (MacLeod, Mathews, & Tata, 1986; Loughnan, Mulgrew, & Lane, 2015). Training modification programs have been used to modify (reduce) attentional biases for food cues in individuals with binge eating disorder, and this reduction in attentional bias for food

cues was associated with changes to subjective food cravings (Schmitz & Svaldi, 2017). As such, research would benefit from using a spatial cuing paradigm such as the IOR to investigate whether attentional biases to particular body images (i.e., non-thin body images) at later stages of attention can be modified across single and multiple training sessions, and what the effects of such modifications are on eating disorders symptoms and body image.

Concluding Statement

The current research has added to the literature on the processing of body stimuli by focusing on the attentional maintenance phase. Collectively, the results of this program of research support differences in attentional maintenance biases to non-thin body information, depending on the individual's level of shape/weight-based self-worth and depending on the nature of the stimuli used (i.e., images versus words). The overall finding was that young women with low levels of shape/weight-based self-worth demonstrated increased attentional disengagement from non-thin images but possibly decreased disengagement from non-thin words, and that this pattern was not influenced by interpersonal rejection versus acceptance. This research endeavour is part of the increasing refinement of methodologies aiming to specify the precise conditions (i.e., stage of attention, content of the stimulus [e.g., thin versus non-thin], type of stimulus [e.g., image versus word], individual difference variable [e.g., shape/weight-based self-worth], and situational factors [e.g., interpersonal acceptance versus rejection]) yielding differential patterns of attention to body stimuli. The increasingly specified theoretical models of information processing enabled by research of this kind comprise a necessary step to improving prevention and treatment programs for the highly prevalent and impairing conditions of body image disturbance and eating disorders.

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Appendices

Appendix A: Materials Used in all Three Studies

1. Demographics Questionnaire
2. Eating Disorder Examination Questionnaire
3. Eating Disorder Examination Questionnaire Scoring

Appendix A: Demographics Questionnaire

What is your current age? _____

Please indicate your country of origin.

- 1) Australia
- 2) New Zealand
- 3) China
- 4) Malaysia
- 5) Singapore
- 6) Indonesia
- 7) Other Asian country
- 8) Other English speaking country
- 9) Other non-English speaking country

Please indicate the country where you completed the majority of your education.

- 1) Australia
- 2) New Zealand
- 3) China
- 4) Malaysia
- 5) Singapore
- 6) Indonesia
- 7) Other Asian country
- 8) Other English speaking country
- 9) Other non-English speaking country

If you were born outside of Australia, how long have you been living in Australia?

Please circle the highest level of education that you have completed:

- 1) Pre-primary Education
- 2) Primary Education
- 3) Junior Secondary Education (e.g. Year 10)
- 4) Senior Secondary Education (e.g. Year 12, Senior Secondary Certificate of Education)
- 5) Certificate Level
- 6) Advanced Diploma and Diploma Level
- 7) Bachelor Degree Level
- 8) Graduate Diploma and Graduate Certificate Level
- 9) Postgraduate Degree Level

RESEARCHER TO COMPLETE:

Participant number: _____

Appendix A: Eating Disorder Examination Questionnaire (EDE-Q)

EATING QUESTIONNAIRE

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all the questions. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days) only.

On how many of the past 28 days	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
1 Have you been deliberately <u>trying</u> to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2 Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3 Have you <u>tried</u> to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4 Have you <u>tried</u> to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5 Have you had a definite desire to have an <u>empty</u> stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6 Have you had a definite desire to have a <u>totally flat</u> stomach?	0	1	2	3	4	5	6
7 Has thinking about <u>food, eating or calories</u> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
8 Has thinking about <u>shape or weight</u> made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
9 Have you had a definite fear of losing control over eating?	0	1	2	3	4	5	6
10 Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6
11 Have you felt fat?	0	1	2	3	4	5	6
12 Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past four weeks (28 days)

13 Over the past 28 days, how many <u>times</u> have you eaten what other people would regard as an <u>unusually large amount of food</u> (given the circumstances)?	
14 On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?	
15 Over the past 28 days, on how many <u>DAYS</u> have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food <u>and</u> have had a sense of loss of control at the time)?	
16 Over the past 28 days, how many <u>times</u> have you made yourself sick (vomit) as a means of controlling your shape or weight?	
17 Over the past 28 days, how many <u>times</u> have you taken laxatives as a means of controlling your shape or weight?	
18 Over the past 28 days, how many <u>times</u> have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape or amount of fat, or to burn off calories?	

Questions 19 to 21: Please circle the appropriate number. Please note that for these questions the term "binge eating" means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19 Over the past 28 days, on how many days have you eaten in secret (ie, furtively)? Do not count episodes of binge eating	No days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
	0	1	2	3	4	5	6
20 On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight? Do not count episodes of binge eating	None of the times	A few of the times	Less than half	Half of the times	More than half	Most of the time	Every time
	0	1	2	3	4	5	6
21 Over the past 28 days, how concerned have you been about other people seeing you eat? Do not count episodes of binge eating	Not at all	Slightly	Moderately	Markedly			
	0	1	2	3	4	5	6

Questions 22 to 28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past 28 days	Not at all		Slightly		Moderate -ly		Markedly
22 Has your <u>weight</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23 Has your <u>shape</u> influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24 How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5	6
25 How dissatisfied have you been with your <u>weight</u> ?	0	1	2	3	4	5	6
26 How dissatisfied have you been with your <u>shape</u> ?	0	1	2	3	4	5	6
27 How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5	6
28 How uncomfortable have you felt about <u>others</u> seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5	6

What is your weight at present? (Please give your best estimate.)

What is your height? (Please give your best estimate.)

If female: Over the past three-to-four months have you missed any menstrual periods?

If so, how many?

Have you been taking the "pill"?

THANK YOU

Appendix A: Eating Disorder Examination Questionnaire Scoring

<u>Subscale</u>	<u>Item Number</u>
Restraint	
Restraint over eating	1
Avoidance of eating	2
Food avoidance	3
Dietary rules	4
Empty stomach	5
Eating Concern	
Preoccupation with food	7
Fear of losing control over eating	9
Eating in secret	19
Social eating	21
Guilt about eating	20
Weight Concern	
Preoccupation with shape or weight	8
Desire to lose weight	12
Importance of weight	22
Reaction to prescribed weighing	24
Dissatisfaction with weight	25
Shape concern	
Flat stomach	6
Preoccupation with shape or weight	8
Fear of weight gain	10
Feelings of fatness	11
Importance of shape	23
Dissatisfaction with shape	26
Discomfort seeing body	27
Avoidance of exposure	28

Appendix B: Materials Used in Study One

1. Ethics approval
2. Research Flyer
3. Information Sheet
4. Consent Form
5. Distractor Task Questions

Appendix B: Study One ANU Human Research Ethics Approval

Human Ethics Protocol 2014/219

aries@anu.edu.au

Thu 29/05/2014 5:31 PM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Elizabeth Rieger <elizabeth.rieger@anu.edu.au>;

THIS IS A SYSTEM-GENERATED E-MAIL. PLEASE DO NOT REPLY. SEE BELOW FOR E-MAIL CONTACT DETAILS.

Dear Ms Mimosa Forsyth,

Protocol: 2014/219

An investigation of Inhibition of Return in the processing of shape/weight information in individuals with high and low levels of shape/weight based self-worth.

I am pleased to advise you that your Human Ethics application received approval by the Chair of the Science and Medical DERC on 29/05/2014.

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved. Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.
2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.
3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.
4. Please advise the HREC if you receive any complaints about the research work.
5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Leanne

Leanne Micklethwait
Ethics Officer,
Research Ethics,
Research Services Division,
Ground Floor,
Chancelry Lower10B
The Australian National University
Acton ACT 0200

Understanding Attention Processes in Young Women

To determine your eligibility to participate you will be first asked to complete a screening questionnaire. If you are eligible you will complete a couple of questionnaires, and a computer based task. Your participation will be confidential and will take approximately 60 minutes to complete.

All participants can receive \$10 for participation, alternatively, first year psychology students can elect to receive 60 minutes course credit for taking part in this study. Thank you!

[illegible]

Appendix B: Study One Information Sheet



Participant Information Sheet

Research Title: Understanding Attention Processes in Young Women

Investigators: Mimosa Forsyth (ANU Research School of Psychology; Clinical Psychology PhD candidate),

Dr. Elizabeth Rieger (ANU Research School of Psychology; Associate Professor) and

Dr. Jason Bell (University of Western Australia School of Psychology; Associate Professor)

You are invited to take part in this research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and ask if there is anything that is not clear or if you would like more information.

What is the focus of this research?

The focus of this research concerns the cognitive processes involved in viewing images of people and animals. The research will utilise a computer-based cognitive task that will require you to view and respond to these images. Seeing some of the images in this study may be distressing for some people, however, the images included in this study are ones that can be found in everyday life.

Do I have to take part?

You do not have to take part. Participation in this study is voluntary and you are free to withdraw at any time without giving any reason and without experiencing any negative personal repercussions.

What will the study involve?

If you decide to participate, you will meet individually in a private room with the researcher. You will be asked to complete a computer-based task in which you will be shown images of objects that occur in everyday life (such as images of animals and people). You will then complete several questionnaires and have your height and weight measured. The study will take approximately an hour in total.

Where will the session be held?

You will meet with the researcher in a private room in the Research School of Psychology at the Australian National University campus to take part in the study.

What will I receive for my participation?

Participants in this research will received ten dollars (\$10). Alternatively, first year psychology students can elect to receive one hour course credit towards research participation requirements.

How will the confidentiality of my personal details be ensured?

All data will be completely anonymous. Numbers rather than participant names will be used when collecting data, and your name will not appear on any research documentation except the consent form. All research information will be stored in a secure filing cabinet in a secure office (in the Psychology Building) at the ANU Research School of Psychology and electronic information will be password protected. Only the investigators (Mimosa Forsyth, Dr. Elizabeth Rieger and Dr. Jason Bell) will have access to this information. Questionnaires will be kept for at least 5 years, after which they will be shredded and electronic information deleted. A report of this study will be submitted for publication as part of a thesis but individual participants will not be identifiable in this report. If after providing informed consent you decide to withdraw from the study, your data will be destroyed.

Are there any side effects and risks associated with this study?

The risk of psychological harm associated with this study is minimal. However, some of the images may be distressing for some people. If you become distressed at any time during the session, you are free to cease participation immediately. Should you need them, contacts for accessing further support are provided below.

What if I have any questions or concerns about the study?

If you have any questions or concerns about the study, or would like to be provided with a copy of the final research report, please do not hesitate to contact Mimosa Forsyth from the Research School of Psychology at the Australian National University (mimosa.forsyth@anu.edu.au).

Ethics Committee Clearance

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns about the way this study is being conducted please contact:

Ethics Manager
The ANU Human Research Committee
The Australian National University
Phone: 02 6125 3427
Email: human.ethics.officer@anu.edu.au

Where can I obtain help or further information?

If you experience any distress as a result of your participation in this study you may wish to contact one of the following services:

ANU Counselling Service

Phone: 02 6125 2442 (ext 52442)

Website: <http://counselling.anu.edu.au>

Lifeline

Phone: 13 11 14

This copy of the Information Sheet is yours to keep. If you agree to take part, then you will be asked to sign a Consent Form and you will be given a copy of that form.

Appendix B: Study One Consent Form**Consent Form**

Research Title: Understanding Attention Processes in Young Women

Investigators: Mimosa Forsyth, Dr. Elizabeth Rieger and Dr. Jason Bell

I state that I agree to participate in the research study entitled "Understanding Attention Processes in Young Women" being conducted by Mimosa Forsyth (Clinical PhD Student), Dr. Elizabeth Rieger (Research Supervisor)) of the Research School of Psychology, Australian National University and Dr. Jason Bell (Research Supervisor) of the School of Psychology, University of Western Australia.

I state that I have read, and that I understand, all of the information on the Information Sheet provided to me.

Name of participant (print clearly): _____

Signature of participant: _____

Date: _____

If you would like to receive a summary of the research once the research program has been completed please provide your e-mail address below:

I would like a summary of the research (provide e-mail address): _____

Appendix B: Study One Distractor Task Questions

PARTICIPANT NUMBER _____

PARTICIPANT TO COMPLETE

Was the first film clip in black and white (circle your answer below)?

Yes

No

In the second film clip, how many people were there (circle your answer below)?

One

Two

A group of people

In the third film clip, was the animal a dog or cat (circle your answer below)?

Dog

Cat

Appendix C: Materials Used in Study Two

1. Ethics Variation Approvals
2. Research Flyer
3. Information Sheet
4. Consent Form
5. Experimental Procedure
6. Debrief

Appendix C: Study Two ANU Ethics Variation Approvals

Variation request for Human Ethics protocol 2014/219

aries@anu.edu.au

Fri 18/11/2016 9:48 AM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Elizabeth Rieger <elizabeth.rieger@anu.edu.au>;

Dear Mimosa Forsyth

The Chair of the HREC has reviewed your variation request and has asked that the following issues be addressed:

Thanks for submitting your variation request. The variation is fine in principle - the ethical aspects of the work are not materially altered. However, you will need to submit updated Information Sheet, recruitment flyer and debrief documents that reflect the changed experimental protocols and the revised incentives for the research tasks. Please use the latest Information Sheet template available from the Ethics Office website - there are new sections (e.g. the Privacy Notice) that are now mandatory on ALL Information Sheets. Once the revised documents have been submitted and reviewed, the variation can be considered for approval.

Please send a response including any amended documents to human.ethics.officer@anu.edu.au

Thank you.

Kind regards

Human Ethics Officer
Research Integrity & Compliance
Research Services Division
Level 2, Birch Building 36
Science Road, ANU
The Australian National University
Acton ACT 2601

T: 6125-3427

E: human.ethics.officer@anu.edu.au

W: <https://services.anu.edu.au/research-support/ethics-integrity>

Variation request for Human Ethics protocol 2014/219

aries@anu.edu.au

Mon 19/12/2016 2:55 PM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Elizabeth Rieger <elizabeth.rieger@anu.edu.au>;

Dear Mimosa Forsyth

The Chair of the HREC has reviewed your variation request and has asked that the following issues be addressed:

Updating previous variation request submitted in November 2016:

1) Change the length of testing to one 90minute testing session, changing reimbursement to \$15 or 1.5 hours of research credit. (Instead of 2 x 1 hour sessions as outlined in previous variation request, due to finalised timings after piloting programs)

2) Include an additional eligibility criteria that all participants must be Caucasian females. This is due to research demonstrating cultural group differences in cognitive processing of body images (Chen & Jackson, 2005). This is also necessary as all the images used are of Caucasian females, and will reduce the the possible confound of 'other race effects'.

The information sheets, consent forms, flyers and debrief have been updated to reflect these changes and will be emailed through.

Chen, H., & Jackson, T. (2005). Are cognitive biases associated with body image concerns similar between cultures? *Body Image*, 2(2), 177-186.
doi:10.1016/j.bodyim.2005.03.005

~~~~~  
Chair's Comments

Thank you for the variation request. The functional alterations to the incentives and recruitment do not materially affect the ethical aspects of the work. Can you please upload the updated documents (Information Sheet, debrief, flyer, consent form) for review, after which approval can proceed.

Please send a response including any amended documents to  
human.ethics.officer@anu.edu.au

Thank you.

Kind regards

Human Ethics Officer  
Research Integrity & Compliance  
Research Services Division  
Level 2, Birch Building 36  
Science Road, ANU  
The Australian National University  
Acton ACT 2601

## Variation - Human Ethics Protocol 2014/219

aries@anu.edu.au

Wed 21/12/2016 10:24 AM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Elizabeth Rieger <elizabeth.rieger@anu.edu.au>;

THIS IS A SYSTEM-GENERATED E-MAIL. PLEASE DO NOT REPLY. SEE BELOW FOR CONTACT DETAILS

Dear Ms Mimosa Forsyth,

Protocol: 2014/219

An investigation of Inhibition of Return in the processing of shape/weight information in individuals with high and low levels of shape/weight based self-worth.

I am pleased to advise the Chair of the Human Research Ethics Committee has approved the variation you submitted on 15/12/2016.

Approved. Thank you for the Information Sheet, consent form, debrief and recruitment documents. Can you please fix the following small issues on these documents before commencing:

Information Sheet:

- (a) You indicate participants come from the "general university population" but the recruitment flyer suggests there is no restriction to the university - should change to "general population" (I understand the flyer may only be posted at the university, but others may see it and respond).
- (b) The data storage period is "five years following publication" not "five years following use... for publication" - you need to keep it for at least five years after the work has been published (this protects you in case the publisher is slow).
- (c) The University counselling service is only for use by ANU staff and students so this restriction should be noted (both here and in the debrief).

Recruitment flyer: I suggest you change the word "required" to "requested" (it sounds less harsh).

You may now commence your research as per your modified protocol.

All the best with your research,

Human Ethics Officer  
Research Integrity & Compliance  
Research Services Division  
Level 2, Birch Building 36  
Science Road, ANU  
The Australian National University  
Acton ACT 2601

T: 6125-3427



Research School of Psychology  
ANU College of Medicine,  
Biology & Environment

The ethical aspects of the research have been approved by the ANU HREC  
2014/219

[illegible]

## Appendix C: Study Two Participant Information Sheet



### Participant Information Sheet

#### Researcher:

The current study is being undertaken by Mimosa Forsyth (Clinical Psychology PhD candidate) and Dr. Elizabeth Rieger (Associate Professor; ANU) from the Research School of Psychology at the Australian National University (ANU) College of Medicine, Biology and the Environment; and Dr. Jason Bell (Associate Professor UWA) from School of Psychology, University of Western Australia.

**Project Title:** Understanding Cognitive Processes in Young Women

#### General Outline of the Project:

- **Description and Methodology:** The focus of this research concerns the cognitive processes involved in viewing images and words of people, animals and household objects. The research will utilise a set of computer-based cognitive tasks where you will be required to respond to a set of images or words. Seeing some of the images in this study may be distressing for some people, however, the images included in this study are ones that are found in everyday life.
- **Participants:** Data from approximately 100 Caucasian females aged 17 to 30 will be collected from a combination of first year psychology students and the general population.
- **Use of Data and Feedback:** The data from this study will contribute to a PhD thesis, associated research publications and conference presentations. A summary of the results can be sent to you upon completion of the research if requested.

#### Participant Involvement:

- **Voluntary Participation & Withdrawal:** You do not have to take part in the current study. Participation in this study is voluntary and you are free to withdraw until the results are prepared for publication, without providing a reason. If you do withdraw, your data will be destroyed and you will still receive course credit or payment.
- **What does participation in the research entail?** If you decide to participate, and meet the eligibility requirements (Caucasian, female, aged 17-30), you will meet individually in a private room with the researcher. You will be asked to complete a computer-based task in which you will be shown images or words of objects that occur in everyday life (such as images of animals, people, and household objects), and asked to respond to these images. You will then

complete several questionnaires and have your height and weight measured. The study will take approximately 1.5 hours in total.

- **Location and Duration:** The research will take place in a private room in the Research School of Psychology at the ANU campus. The study will take up to 1.5 hours in total to complete.
- **Remuneration:** Participants in this research will receive fifteen dollars (\$15). Alternatively, psychology students can elect to receive 1.5 hours of course credit towards research participation requirements. Remuneration will be provided following participation. If you choose to withdraw you will still be provided with \$15 or course credit.
- **Risks:** The risk of psychological harm associated with this study is minimal, as all the images and words you will see are present in everyday life. However, some of the images contain dangerous animals and parts female bodies and may be distressing for some people. If you become distressed at any time during the session, you are free to cease participation immediately. Should you need them, contacts for accessing further support are provided below.
- **Benefits:** It is unlikely that you will personally benefit from participating in this research, however, we expect that this research will help to provide a greater understanding of how young women process information about the body, which helps to understand body image concerns.

#### Exclusion criteria:

- **Participant Limitation:** Eligibility of participation in the current study is restricted to Caucasian female ANU students aged 17 to 30.

#### Confidentiality:

- **Confidentiality:** All data will be completely confidential, and will be protected as far as the law allows. Your name will not appear on any research documentation except the consent form. Data collected from this study will be used to inform future research and may be submitted for publication as part of a thesis, however, individual participants will not be identifiable in such a report. If you decide to withdraw from the study, your data will be destroyed.

#### Privacy Notice:

- In collecting your personal information within this research, the ANU must comply with the Privacy Act 1988. The ANU Privacy Policy is available at [https://policies.anu.edu.au/ppl/document/ANUP\\_010007](https://policies.anu.edu.au/ppl/document/ANUP_010007) and it contains information about how a person can:
  - Access or seek correction to their personal information;
  - Complain about a breach of an Australian Privacy Principle by ANU, and how ANU will handle the complaint.

#### Data Storage:

- **Where:** All data management procedures will comply with the *Privacy Act 1988* (Cth) and the ANU policy for the Responsible Practice of Research. Research information will be stored in a secure filing cabinet in a secure office (in the Psychology Building) at the ANU Research School of Psychology and

electronic information will be stored on password-protected computer. Only the investigators (Mimosa Forsyth, Dr. Elizabeth Rieger and Dr. Jason Bell) will have access to this information.

- **How long:** All data and associated consent forms will be kept for at least 5 years following publications arising from the research. After 5 years, all questionnaires will be shredded and electronic information deleted.
- **Handling of Data following the required storage period:** After 5 years, all questionnaires will be shredded and electronic information deleted.

#### Queries and Concerns:

- **Contact Details for More Information:** If you have any questions or concerns about the study, please contact email Mimosa Forsyth ([mimosa.forsyth@anu.edu.au](mailto:mimosa.forsyth@anu.edu.au)), or Dr. Elizabeth Rieger ([elizabeth.rieger@anu.edu.au](mailto:elizabeth.rieger@anu.edu.au)).
- **Contact Details if in Distress:** If you experience any distress as a result of your participation in this study you may wish to contact your GP or one of the following services.  
*ANU Counselling Service* (only available to ANU staff and students)  
Phone: 02 6125 2442 (ext 52442)  
Website: <http://counselling.anu.edu.au>  
*Lifeline* Phone: 13 11 14

#### Ethics Committee Clearance:

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee (Protocol 2014/219). If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager  
The ANU Human Research Ethics Committee  
The Australian National University  
Telephone: +61 2 6125 3427  
Email: [Human.Ethics.Officer@anu.edu.au](mailto:Human.Ethics.Officer@anu.edu.au)

**Appendix C: Study Two Consent Form****WRITTEN CONSENT for Participants****Understanding Cognitive Processes in Young Women**

I have read and understood the Information Sheet you have given me about the research project, and I have had any questions and concerns about the project (listed here

\_\_\_\_\_

\_\_\_\_\_

addressed to my satisfaction.

I agree to participate in the project.

YES ☐ NO ☐

Would like to receive a summary of results.

YES ☐ NO ☐

If yes, please provide your email address: .....

Signature:.....

Date:.....

### Appendix C: Study Two Experimental Procedure

- 1) **Information Sheet and Consent (Paper forms)** – *“I am going to read through the information sheet with you. Please stop me at any point if you have any questions or concerns”.*

Have the participant sign the consent form. Participant is to keep the information sheet, as it contains ethics and contact information.

#### **The Order of the IOR tasks depends on participant number**

- 2) **IOR** – *“Now we have another spatial task for you to do There will be 5 practice runs first. After the practice runs you will begin the task. Each round take around 5 minutes, try and maintain your concentration as much as you can. Try to respond as quickly yet as accurately as you can.”*

- Select 1 for the thin body words and 2 for the non-thin body words

*“Stare at the fixation cross in the centre of the screen at the start of each trial. When the word appears, read the word aloud, this voice recorder will be recording your responses. When a white cross appears indicated which side of the screen it appears on by pressing the left or right arrow key. The location of the word is not predictive of the location of the white cross. If no white cross appears don’t make a response”.*

- 3) **Get participant to complete the EDE-Q on Qualtrics**

- 4) **Debrief** Debrief participant using the Debrief sheet. The participant is not to keep this sheet.

## Appendix C: Study Two Participant Debrief



### Participant Debrief

#### Study on Understanding Cognitive Processes in Young Women

Thank you for participating in this study. The purpose of this debriefing is to provide you with more information about the study you have just participated in and to provide an opportunity for your comments or for you to discuss any concerns you may have.

No names of participants will be present on the data collected from the study. All data sheets will have numeric identifiers to ensure your confidentiality.

The main purpose of the study is to investigate if individuals process differently depending on areas in life they view as important in defining who they are. More specifically, this study examined attention towards body related words in people who view their body image as important to how they see themselves. This information will be used to enhance treatment interventions for people who experience concerns around these issues (such as people with eating disorders). In order to achieve the aims of the study, you completed a number of measures of attentional processing of shape/weight words, as well as questionnaires to assess how your weight and shape affects how you feel about yourself.

For this study to produce accurate results, it is crucial that participants are not aware of the nature of the study until the debriefing. As a result, please do not discuss this study with anyone until the end of the data collection period in December 2017 as others may also choose to take part in this study.

If you have any further questions or concerns about this research, or have experienced any distress as a result of this research, please contact the primary investigator Mimosa Forsyth on [mimosa.forsyth@anu.edu.au](mailto:mimosa.forsyth@anu.edu.au) or research supervisor Dr Elizabeth Rieger at [elizabeth.rieger@anu.edu.au](mailto:elizabeth.rieger@anu.edu.au). Alternatively, you can contact the ANU counselling Centre (6125 2442) or Lifeline (131114) if you require any support for issues that arise as a result of participation in the study.

Thank you once again for your time and effort in participating in this study. We are very grateful to you for your contribution to this important research which aims to improve our understanding of the attentional processes in young women. Your participation will potentially help to improve treatment interventions for people struggling with concerns about their body image.

### **Appendix D: Materials Used in Study Three**

1. Ethics Approval
2. Research Flyer
3. Participant Information Sheet
4. Consent Form
5. Pre-screening Health Behaviours Questionnaire
6. Manipulation Check
7. State Self-Esteem Scale Items
8. Participant Debrief

## Appendix D: Study Three ANU Human Research Ethics Approval

### Human Ethics Protocol 2014/795

aries@anu.edu.au

Mon 16/03/2015 8:41 AM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Amy Dawel <amy.dawel@anu.edu.au>;

THIS IS A SYSTEM-GENERATED E-MAIL. PLEASE DO NOT REPLY. SEE BELOW FOR E-MAIL CONTACT DETAILS.

Dear Ms Mimosa Forsyth,

Protocol: 2014/795

An Investigation of the Effects of Ostracism on Attention Biases, Body Dissatisfaction, and Dieting Intention in Individuals with High and Low Levels of Shape/Weight Based Self-Worth

I am pleased to advise you that your Human Ethics application received approval by the Chair of the HREC on 16 March 2015.

PLEASE NOTE: The Chair has advised the following:

"Approved. Thank you for the amended documentation and your considered responses to the questions raised by the HREC. While I do understand your position on the deception, I also think that it would take only slightly curious participants a short time to work out what the focus of the research is. On the other hand, I am not sure how else you could design the study and not let them know. I am also not really convinced that just because images are in the media then they are not offensive to some people (indeed, some media outlets seem to consider offensive imagery good for business) - but again, I don't think this is a significant quibble."

For your information:

1. Under the NHMRC/AVCC National Statement on Ethical Conduct in Human Research we are required to follow up research that we have approved. Once a year (or sooner for short projects) we shall request a brief report on any ethical issues which may have arisen during your research or whether it proceeded according to the plan outlined in the above protocol.
2. Please notify the committee of any changes to your protocol in the course of your research, and when you complete or cease working on the project.
3. Please notify the Committee immediately if any unforeseen events occur that might affect continued ethical acceptability of the research work.
4. Please advise the HREC if you receive any complaints about the research work.
5. The validity of the current approval is five years' maximum from the date shown approved. For longer projects you are required to seek renewed approval from the Committee.

All the best with your research,

Kim

Ms Kim Tiffen  
Human Ethics Manager  
Research Integrity & Compliance,  
Research Services,  
Ground Floor, Chancellery 108  
Ellery Crescent,  
The Australian National University  
ACTON ACT 2601  
T: +61 6125 3427  
F: +61 2 6125 4807  
Kim.Tiffen@anu.edu.au or  
human.ethics.officer@anu.edu.au

## Appendix D: Study Three ANU Human Research Ethics Variation Approval

### Variation - Human Ethics Protocol 2014/795

aries@anu.edu.au

Fri 4/03/2016 11:10 AM

To: Mimosa Forsyth <mimosa.forsyth@anu.edu.au>;

Cc: Human.Ethics.Officer@anu.edu.au <human.ethics.officer@anu.edu.au>; Amy Dawel <amy.dawel@anu.edu.au>;

THIS IS A SYSTEM-GENERATED E-MAIL. PLEASE DO NOT REPLY. SEE BELOW FOR CONTACT DETAILS

Dear Ms Mimosa Forsyth,

Protocol: 2014/795

An Investigation of the Effects of Ostracism on Attention Biases, Body Dissatisfaction, and Dieting Intention in Individuals with High and Low Levels of Shape/Weight Based Self-Worth

I am pleased to advise the Chair of the Human Research Ethics Committee has approved the variation you submitted on 29/02/2016 requesting:

Remove two measures the Physical Appearance State and Trait Anxiety Scale (PASTAS; Reed, Thompson, Brannick, & Sacco, 1991), and the Dietary Intention Scale (Cruwys, Platow, Rieger, & Bryne, 2013) following data collection and analysis from study 1, and add in two alternate measures the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991) and the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994).

The BIDR is a 40-item self-report questionnaire used to assess social desirability bias, which is tendency to respond to questions in a socially desirable manner (Ellingson, Smith, & Sackett, 2001). It consists of two subscales: Self-Deception (i.e. the unintentional tendency to portray oneself in a favourable light) and Impression Management (i.e. the intentional distortion of one's self-image to be perceived positively by others; Li & Bagger, 2007). Each subscale is comprised of 20 items. Participants indicate the extent to which they agree with the statements on a 7-point Likert scale, ranging from 1 (not true) to 7 (very true). Example items include, 'I am a completely rational person' (Self-Deception Scale) and 'I never take things that don't belong to me' (Impression Management subscale). Only items rated as 6 or 7 contribute to the total scores, with higher scores indicating a tendency to engage in socially desirable responding. Response biases have the potential to undermine the validity of inferences made from self-report data, and therefore it is important that participants were assess for socially desirable responding to ensure that this was equivalent across condition. The BIDR shows good reliability in the form of test-retest reliability (Vispoel & Tao, 2013) and validity in the form of discriminant validity (low correlation between the subscales; Paulhus, 1991). The BIDR is a 40-item self-report questionnaire used to assess social desirability bias, which is tendency to respond to questions in a socially desirable manner (Ellingson, Smith, & Sackett, 2001). It consists of two subscales: Self-Deception (i.e. the unintentional tendency to portray oneself in a favourable light) and Impression Management (i.e. the intentional distortion of one's self-image to be perceived positively by others; Li & Bagger, 2007). Each subscale is comprised of 20 items. Participants indicate the extent to which they agree with the statements

on a 7-point Likert scale, ranging from 1 (not true) to 7 (very true). Example items include, 'I am a completely rational person' (Self-Deception Scale) and 'I never take things that don't belong to me' (Impression Management subscale). Only items rated as 6 or 7 contribute to the total scores, with higher scores indicating a tendency to engage in socially desirable responding. Response biases have the potential to undermine the validity of inferences made from self-report data, and therefore it is important that participants were assessed for socially desirable responding to ensure that this was equivalent across condition. The BIDR shows good reliability in the form of test-retest reliability (Vispoel & Tao, 2013) and validity in the form of discriminant validity (low correlation between the subscales; Paulhus, 1991).

The EDE-Q will be administered to validate exclusion criteria and allocation to control group. EDE-Q assesses severity and frequency of eating disorder psychopathology; the EDE-Q is a self-report version of the Eating Disorder Examination. The EDE-Q is a 28-item self-report questionnaire focusing on the occurrence and frequency of eating disorder symptomatology over the past 28 days (Fairburn & Beglin, 1994). The EDE-Q assesses abnormal eating behaviour, such as bingeing or restraint. Participants are required to respond on 7-point Likert scale, from 0 (no days) to 6 (everyday), to items assessing attitudinal features. On the remainder of questions assessing the occurrence of eating disorder behaviours, participants indicate the number of times or days that these have occurred. The items are divided into subscales: dietary constraint, eating concern, shape concern, and weight concern. An average of these scales provides a global measure of eating disorder psychopathology, the higher the global score the greater the severity. The EDE-Q is a widely used instrument due to its sound psychometric properties. It has high test-retest reliability (Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004a), strong internal consistency of items (Mond, Hay, Rodgers, Owen, & Beumont, 2004b) and for the global and subscale scores (Peterson et al., 2007).

Chair's Comments 1/3/2016:

Conditionally approved. Thank you for advising us of the change in data collection instruments that you wish to use in your research protocol. If the use of different instruments will change the estimated time for participants to complete the requested tasks, you need to amend the Information Sheet to reflect the changed time demands of participation. Also, can you please upload the new instruments to ARIES so that your protocol will be complete on the system?

Researcher's Response 1/3/2016:

Hi,

The use of the two different instruments does not change the estimated time for participants to complete the task. I have uploaded the two new instruments on to ARIES.

Let me know if there is anything else you require, Mimosa

Chair's Response 4/3/2016:

Approved. Thank you for providing the new instruments and for advising about the expected time required for participants to engage in the new research tasks.

You may now commence your research as per your modified protocol.

All the best with your research,

Human Ethics Manager  
Research Ethics  
Research Integrity & Compliance  
Ground Floor  
Chancelry Lower10B  
The Australian National University  
Acton ACT 2601  
T: 6125-3427  
E: [human.ethics.officer@anu.edu.au](mailto:human.ethics.officer@anu.edu.au)  
W: <https://services.anu.edu.au/research-support/ethics-integrity>



Research School of Psychology  
ANU College of Medicine,  
Biology & Environment

[illegible]

## Appendix D: Study Three Participant Information Sheet



### Participant Information Sheet

#### Researcher:

The current study is being undertaken by Mimosa Forsyth (Clinical Psychology PhD candidate), and Dr. Elizabeth Rieger (Associate Professor; ANU), from the Research School of Psychology at the Australian National University (ANU) College of Medicine, Biology and the Environment; and Dr. Jason Bell (Associate Professor UWA) from School of Psychology, University of Western Australia.

**Project Title:** Mental Visualisation and Other Cognitive Processes in Young Women

#### General Outline of the Project:

- **Description and Methodology:** The focus of this research concerns the cognitive processes involved in viewing images of people and animals. The research will utilise a computer-based cognitive task requiring mental visualisation, you will then be asked to respond to a set of images. Seeing some of the images in this study may be distressing for some people, however, the images included in this study are ones that can be found in everyday life.
- **Participants:** This study consists of completing a health-behaviour questionnaire, followed by two computer-based tasks, several questionnaires and have your height and weight measured. The study will take approximately an hour in total. Data from approximately 100 females aged 17 to 30 will be collected from a combination of first year psychology students and the general university population.
- **Use of Data and Feedback:** The data from this study will contribute to a PhD thesis, associated research publications and conference presentations. A summary of the results of the study can be sent to you upon completion of the research if requested.

#### Participant Involvement:

- **Voluntary Participation & Withdrawal:** You do not have to take part. Participation in this study is voluntary and you are free to withdraw until the results are prepared for publication, without giving any reason. If you do withdraw, your data will be destroyed and you will still receive course credit or payment.
- **What will participants have to do?** If you decide to participate, to ensure you are eligible to participate you will be first asked to complete a few questions about health related behaviours. If you are eligible on this basis, you will meet individually in a private room with the researcher. You will be asked to complete a computer-based task in which you will be required to practice your

mental visualisation, you will then be shown images of objects that occur in everyday life (such as images of animals and people), and asked to respond to these images. You will then complete several questionnaires and have your height and weight measured. The study will take approximately an hour in total.

- **Location and Duration:** The research will take place in a private room in the Research School of Psychology at the ANU campus. You will only be required to attend one session. The study will take up to 60 minutes to complete.
- **Incentives:** Participants in this research will receive ten dollars (\$10). Alternatively, first year psychology students can elect to receive one hour course credit towards research participation requirements. This will be provided upon attending the study session. If you choose to withdraw you will still be provided with \$10 or course credit.
- **Risks:** The risk of psychological harm associated with this study is minimal, as all the images you will see are images that are present in everyday life. However, some of the images contain dangerous animals and parts female bodies and may be distressing for some people. If you become distressed at any time during the session, you are free to cease participation immediately. Should you need them, contacts for accessing further support are provided below.

#### Exclusion criteria:

- **Participant Limitation:** Eligibility of participation in the current study is restricted to female ANU students aged 17 to 30 who meet eligibility requirements on the health screening questionnaire.

#### Confidentiality:

- **Confidentiality:** All data will be completely confidential, and will be protected in so far as the law allows. Your name will not appear on any research documentation except the consent form. Data collected from this study will be used to inform future research and may be submitted for publication as part of a thesis, however, individual participants will not be identifiable in such a report. If you decide to withdraw from the study, your data will be destroyed.

#### Data Storage:

- **Where:** All data management procedures will be in compliance with the *Privacy Act 1988* (Cth) and the ANU policy for the Responsible Practice of Research. Research information will be stored in a secure filing cabinet in a secure office (in the Psychology Building) at the ANU Research School of Psychology and electronic information will be stored on password protected computer. Only the investigators (Mimosa Forsyth, Dr. Elizabeth Rieger and Dr. Jason Bell) will have access to this information. All data and associated consent forms will be kept for at least 5 years following use for thesis or publications arising from the research. After 5 years all questionnaires will be shredded and electronic information deleted.

**Queries and Concerns:**

- **Contact Details for More Information:** If you have any questions or concerns about the study, please contact Mimosa Forsyth ([mimosa.forsyth@anu.edu.au](mailto:mimosa.forsyth@anu.edu.au)), or Dr. Elizabeth Rieger ([elizabeth.rieger@anu.edu.au](mailto:elizabeth.rieger@anu.edu.au)).
- **Contact Details if in Distress:** If you experience any distress as a result of your participation in this study you may wish to contact your GP or one of the following services.

***ANU Counselling Service***

Phone: 02 6125 2442 (ext 52442)

Website: <http://counselling.anu.edu.au>

***Lifeline*** Phone: 13 11 14

**Ethics Committee Clearance:**

The ethical aspects of this research have been approved by the ANU Human Research Ethics Committee. If you have any concerns or complaints about how this research has been conducted, please contact:

Ethics Manager

The ANU Human Research Ethics Committee

The Australian National University

Telephone: +61 2 6125 3427

Email: [Human.Ethics.Officer@anu.edu.au](mailto:Human.Ethics.Officer@anu.edu.au)

**Appendix D: Study Three Consent Form****Consent Form**

**Research Title:** Mental Visualisation and Other Cognitive Processes in Young Women

**Investigators:** Mimosa Forsyth, Dr. Elizabeth Rieger and Dr. Jason Bell

I state that I agree to participate in the research study entitled “Mental Visualisation and Other Cognitive Processes in Young Women” being conducted by Mimosa Forsyth (PhD (Clinical Psychology) candidate), Dr. Elizabeth Rieger (Associate Professor; ANU), and Dr. Jason Bell (Associate Professor UWA),

I state that I have read, and that I understand, all of the information on the Information Sheet provided to me.

Name of participant (print clearly): \_\_\_\_\_

Signature of participant: \_\_\_\_\_

Date: \_\_\_\_\_

**Appendix D: Study Three Pre-Screening Health Behaviours Questionnaire****Demographic Information**

Age: \_\_\_\_\_

Gender: Male/Female/Other

Height (in cm): \_\_\_\_\_

Weight (in kg): \_\_\_\_\_

Country of birth: \_\_\_\_\_

Major at ANU: \_\_\_\_\_

**The Health of Young Adults**

Do you smoke cigarettes or tobacco? Please tick the correct response below.

☐ Yes

☐ No

If you answered yes, how many do you smoke per day?

\_\_\_\_\_

When did you last consume alcohol? Please tick the correct response below.

☐ Within the last week

☐ Within the last month

☐ Over one month ago

☐ Never

On a drinking day, how much do you usually drink?

\_\_\_\_\_

Do you have a healthy diet with 5 servings of vegetables and 2 servings of fruit per day?

☐ Yes

☐ No

Over the past month have there been any times when you have felt that you have eaten what other people would regard as an unusually large amount of food?

☐ Yes, how many times would this have occurred \_\_\_\_\_

On how many of these occasions did you feel a sense of having lost control over your eating? \_\_\_\_\_

☐ No

Did you do physical activity in the last week? Please tick the correct response below.

☐ Yes, how many days did you engage in physical activity \_\_\_\_\_

On average, how many minutes per day do you participate in physical activity?  
\_\_\_\_\_

☐ No

Have you ever spent time in the sun without adequate protection, as a means of achieving a tan (e.g., using high SPF sunscreen and wearing protective clothing)?

☐ Yes

☐ No

On average, how many minutes per day do spend in the sun?

---

**Appendix D: Study Three Manipulation Check**

Australian  
National  
University

Science, Medicine & Health  
ANU College of Medicine, Biology & Environment

What percentage of throws were thrown to you?

0 10 20 30 40 50 60 70 80 90 100

0%



What strategies were you using when visualising tossing the ball to the other players?

Please respond to the following questions using the scale below:

|                                                               | Not at all            | A Little              | Somewhat              | Very                  | Extremely             |
|---------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Did the other participants include you during the game?       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Did you feel that the other participants did not include you? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

>>

Appendix D: Study Three State Self-Esteem Scale Items



Australian  
National  
University

Science, Medicine & Health  
ANU College of Medicine, Biology & Environment

This is a questionnaire designed to measure what you are thinking at the moment. There is no right answer for any statement. The best answer is what you feel is true of yourself at this moment. Please be sure to answer all of the items as they are true for you RIGHT NOW.

|                                            | Not at all            | A Little              | Somewhat              | Very                  | Extremely             |
|--------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. Right now I feel displeased with myself | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. Right now I feel good about myself      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

>>

## Appendix D: Study Three Participant Debrief



### **Participant Debrief: Study on mental visualisation and other cognitive processes in young women**

Thank you for participating in this study. The purpose of this debriefing is to provide you with more information about the study you have just participated in and to provide an opportunity for your comments or for you to discuss any concerns you may have.

No names of participants will be present on the data collected from the study. All data sheets will have numeric identifiers to ensure your confidentiality.

The main purpose of the study is to investigate if the effects of interpersonal stress affect people differently depending on areas in life they view as important in defining who they are. More specifically, this study examined how the experience of interpersonal stress impacts on people who view their body image as important to how they see themselves. This information will be used to enhance treatment interventions for people who experience concerns around these issues (such as people with eating disorders).

In order to conduct the study, it was necessary that you were not aware of the main purpose of the study. The focus of the study was concealed to make sure your responses to the computer tasks and questionnaires were as 'natural' as possible.

In order to achieve the aims of the study, the computer ball-tossing task was designed to simulate an experience of interpersonal stress. During the first part of the research, you were told that you were completing a task investigating mental visualisation. You were told that this is a study about the relationship between visualisation and cognitive processes. This was untrue. In actual fact, this was a task looking at how exclusion from a group affects attention to shape and weight images. It is important that you know that the computer task you completed is completely made-up, and you were playing against a computer rather than real people. When you were playing the game, the computer was programmed not to pass the ball to half of the participants, chosen on a completely random basis. You were randomly assigned to either the inclusion or rejection condition. There was no personal basis for your allocation to either the inclusion or rejection conditions. If you were in the rejection condition, after you selected who you wanted to throw the ball to, you did not receive the ball again. If you were in the inclusion condition, the computer was programmed to continue passing the ball to you. The condition allocation was pre-determined and had absolutely no relationship to you as an individual.

Measures of attentional processing of shape/weight images was obtained after you completed the ball-tossing task. The study is investigating whether the interpersonal stress present in the rejection condition affected these factors.

For this study to produce accurate results, it is crucial that participants are not aware of the concealed nature of the experiment until the debriefing. As a result, please do not discuss this study with anyone until the end of the data collection period in December 2016 as others may also choose to take part in this study.

If you have any further questions or concerns about this research, or have experienced any distress as a result of this research, please contact the primary investigator Mimosa Forsyth on [mimosa.forsyth@anu.edu.au](mailto:mimosa.forsyth@anu.edu.au) or research supervisor Dr Elizabeth Rieger at [elizabeth.rieger@anu.edu.au](mailto:elizabeth.rieger@anu.edu.au). Alternatively, you can contact the ANU counselling Centre (6125 2442) or Lifeline (131114) if you require any support for issues that arise as a result of participation in the study.

Thank you once again for your time and effort in participating in this study. We are very grateful to you for your contribution to this important research which aims to improve our understanding of the effects of interpersonal stress on attentional processes, self-esteem, and dieting intentions. Your participation will potentially help to improve treatment interventions for people struggling with concerns about their body image and interactions with others.