UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

School of Psychology

An Investigation of the Role of Thought-Shape Fusion in Disordered Eating.

by

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Thesis for the degree of Doctorate in Clinical Psychology

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ABSTRACT

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Doctorate in Clinical Psychology

AN INVESTIGATION OF THE ROLE OF THOUGHT-SHAPE FUSION IN DISORDERED EATING

By Stephanie Pisarski

A literature review presents research investigating the role of thought-shape fusion (TSF) in eating disorder psychopathology. As TSF is a relatively new area of research, reviewing literature at this stage aimed to identify methodological issues, directions for future research, and clinical implications of findings, to aid progression of research and treatments for those with eating disorders. Literature was discussed in relation to criteria set out by Shafran et al. (1999) to determine whether a cognitive distortion plays a role in a psychopathological disorder. Evidence suggests TSF does have a role to play, as it was associated with eating disorder psychopathology and experimental manipulation of the construct increased feelings of fatness, moral wrongdoing, urges to carry out neutralising behaviours, anxiety, and guilt, in clinical and non-clinical samples, which are key maintaining factors of eating disorder psychopathology (Fairburn et al., 2003). However, it was unclear from the literature whether perceived likelihood of weight gain also increased. Research is yet to investigate whether a reduction in TSF leads to a reduction in disordered eating, and the role of other factors (such as thought control strategies) in TSF and disordered eating behaviours. The empirical study investigated whether TSF and thought suppression led to more disordered eating in a university sample. Questionnaires measuring TSF, thought suppression, and disordered eating behaviours, were completed online by 355 participants. The findings showed TSF had a significant main effect on all disordered eating behaviours measured, apart from purging. Thought suppression had a main effect on binge-eating behaviours and global eating disorder psychopathology only. Thought suppression was also found to add to the effects of TSF on disordered eating behaviours, but no significant interaction effects emerged. Future research is needed to determine whether similar findings exist in a clinical sample.

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Declaration of Authorship

I declare that the thesis entitled "An investigation of the role of thought-shape fusion in disordered eating" and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
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- none of this work has been published before submission.

Signed: ……..

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DEFINITIONS OF TERMS

Anorexia nervosa

Refusal to maintain minimally normal body weight (APA, 200).

Binge-eating

Eating what others would consider to be a large amount of food given the circumstances, with a sense of loss of control at the time (Fairburn, 2008).

Binge-eating disorder

Recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of bulimia nervosa (APA, 2000).

Bulimia nervosa (BN)

Repeated episodes of binge-eating followed by compensatory behaviours (APA, 2000).

Compensatory behaviours

Behaviours carried out to compensate for specific episodes of perceived or actual overeating (Fairburn, 2008).

Disordered eating

Problematic eating behaviours, which are less severe or occur less frequently than in those who meet full criteria for an eating disorder (Gan et al., 2011).

Eating disorder (ED)

Severe disturbance in eating behaviour (APA, 2000).

Eating disorder not otherwise specified

Any eating-related disorder that does not fully meet diagnostic criteria for a clinical eating disorder (APA, 2000).

Dietary/eating restraint

The intention to restrict food intake to control one's body weight (Williamson et al., 2007).

Purging behaviours

Self-induced vomiting or misuse of laxatives or diuretics (Fairburn, 2008).

Restricted eating

"True under-eating in a physiological sense" (Fairburn, 2008, p.11).

Thought-Action fusion (TAF)

A cognitive distortion whereby clients fuse their thoughts and actions, meaning they would be more likely to believe *thinking* about a negative event was equal to the actual event occurring (Frost & Steketee, 2002)

Thought-shape fusion (TSF)

A cognitive distortion consisting of the belief that thinking about eating a forbidden food will increase the likelihood of gaining weight or changing shape (likelihood TSF), is morally equivalent to actually eating the food (moral TSF), and will increases feelings of fatness (feeling TSF; Shafran et al., 1999).

Thought suppression

A thought control strategy whereby one tries deliberately not to think about certain thoughts (Wegner, 1994).

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The Role of Thought-Shape Fusion in Eating Disorder Psychopathology.

Literature Review

by

Stephanie Pisarski

Doctorate in Clinical Psychology

May 2013

Introduction

Disordered eating behaviours have been found to predict problematic outcomes for adolescents and young adults, such as weight gain or EDs (e.g. Heatherton, Mahamedi, Striepe, Field, & Keel, 1997; Lock, Riesel, & Steiner, 2001; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). As EDs come with high risk of mortality[1] (RCP, 2000), it is important to understand the aetiology and maintaining factors of disordered eating behaviours and EDs, to ensure effective treatments are offered.

To highlight the difference between EDs and disordered eating behaviours, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA, 2000) defines eating disorders (ED) as "severe disturbances in eating behaviour" (p. 583). It recognises three diagnostic categories of ED: anorexia nervosa (AN; refusal to maintain minimally normal body weight), bulimia nervosa (BN; repeated episodes of binge-eating followed by compensatory behaviours[2]), and eating disorders not otherwise specified (EDNOS; any eating related disorder that does not meet full diagnostic criteria). To meet criteria for any ED, an individual must show concern about their body shape and/or weight (APA, 2000). Conversely, disordered eating behaviours encompass problematic eating behaviours, such as dietary restraint/restricted eating[3], binge-eating, or purging, however they are less severe or frequent than in those who meet full criteria for an ED (Gan, Mohd Nasir, Zalilah, & Hazizi, 2011). The prevalence rate for EDs is thought to lie between 1% and 1.5% in young women (Royal College of Psychiatrists

[1] The standardized mortality ratio has been estimated at 538 (compared with 136 to 197 for depression, schizophrenia, and alcoholism; RCP, 2000)

[2] Such as self induced vomiting or excessive exercise.

[3] Dietary restraint is the *intention* to restrict food intake to control one's body weight (Williamson et al., 2007), whereas restricted eating is "true under-eating in a physiological sense" (Fairburn, 2008, p.11).

(RCP), 2000)[4] and the lifetime prevalence of EDs in adults is thought to be around 0.6% for AN and 1% for BN (Treasure, Claudino, & Zucker, 2010), meaning EDs impact on a significant proportion of the population, particularly women.

One area that has attracted researcher's attention in terms of understanding ED psychopathology is the overlap between EDs and obsessive-compulsive disorder (OCD), as it is an area of controversy. NICE (2005) stipulates that OCD is an anxiety disorder consisting of obsessions[5], compulsions[6], or both, the nature of which have been thought to share similarities with some features of ED psychopathology as well as differences. It has been widely accepted that EDs and anxiety disorders are highly co-morbid, (particularly EDs and OCD; e.g. Anderluh, Tchanturia, Rabe-Hesketh, & Treasure, 2003; Blinder, Cumella, & Sarnathara, 2006; Milos, Spindler, Ruggiero, Klaghofer, & Schnyder, 2002), which research has shown leads to poorer treatment outcomes (e.g. Bulik, Sullivan, Fear, & Joyce, 1997; Swinbourne et al., 2012). The controversy regarding the overlap between the conditions has arisen due to it being unclear whether they should be considered under the same diagnostic umbrella (e.g. Altman & Shankman, 2009; Hollander & Benzaquen, 1997; Olatunji, Tart, Shewmaker, Wall, & Smits, 2010) or if they are distinct conditions sharing some common symptoms (e.g. Albert, Venturello, Maina, Ravissa, & Bogetto, 2001; Grabe, Thiel, & Freyberger, 2000; Jimenez-Murcia et al., 2007; Wu, 2008). Shafran (2002) proposed understanding beliefs may provide a link between the two disorders and therefore, may offer further insight into their relationship. The Obsessive Compulsive Cognitions Working Group (OCCWG; 1997; 2001; 2003)

[4] Men can also be affected by eating disorders, however the conditions are much more common amongst women (RCP, 2000).

[5] Defined as "an unwanted intrusive thought, image, or urge that repeatedly enters the person's mind (NICE, 2005, p.4).

[6] Defined as "repetitive behaviours or mental acts that the person feels driven to perform" (NICE, 2005, p.4).

proposed six core OCD belief domains, which may be relevant to disordered eating behaviours: inflated responsibility, over-importance of thoughts (including thought-action fusion; TAF (which will be explored in more detail in the following paragraph), importance of controlling one's thoughts, overestimation of threat, intolerance of uncertainty, and perfectionism[7] (Roncero, Perpina, & Garcia-Sereano, 2011). Of these, perfectionism has been the most widely researched in EDs (Roncero et al., 2011) and has been found to be a key component of its psychopathology[8] (e.g. Egan, Wade, & Shafran, 2011; Franco-Paredez, Mancilla-Diaz, Vazquez-Arevalo, Lopez-Aquilar, & Alvarez-Rayon, 2005), however more recently, Shafran, Teachman, Kerry, and Rachman (1999) hypothesised a similar concept to TAF may also exist for individuals with EDs, known as thought-shape fusion (TSF).

Unlike perfectionism, TSF is still in the early stages of development and further understanding of the role it plays in ED psychopathology, is needed to contribute to developing knowledge of whether OCD and EDs overlap. Whilst some argue that TAF and TSF are effectively the same concept, Shafran et al. (1999) concluded that they are similar but separable in a number of ways. In OCD, TAF is a cognitive distortion consisting of clients fusing their thoughts and an action, meaning they are more likely to believe thinking about a negative event is equal to the actual event occurring (Frost & Steketee, 2002). TSF is considered a similar cognitive distortion, consisting of the belief that thinking about eating a forbidden food will increase the likelihood of gaining weight or changing shape, is morally equivalent to actually eating the food, and will increases feelings of fatness (Shafran et al., 1999). Moreover, it is thought that both can

[7] Clinical perfectionism often encompasses over-evaluation of achieving and achievement in valued domains of life, which leads to marginalization of other areas of life, rigorous pursuit of personally demanding standards despite adverse effects on actual performance, and fear of failing to meet personal standards (Fairburn, 2008).

[8] ED psychopathology refers to unhelpful/abnormal cognitive and behavioural features associated with the disorder.

be induced experimentally, lead to similar negative emotions, and similar corrective urges, highlighting where similarities may lie. However, TAF consists of two components, whereas TSF consists of a unifactorial structure. Also, there is no realistic connection between a thought and the action in TAF, whereas there is in TSF (Shafran et al., 1999), thus further fuelling the controversy.

Therefore, the debate of whether these two disorders overlap may benefit from a better understanding of the role TSF plays in ED psychopathology. According to Shafran et al. (1999), a cognitive distortion may play a role in a psychopathological disorder if: "it is associated with the psychopathology of the disorder, experimental manipulation of the distortion results in the predicted effects on psychopathology, and a reduction/elimination of the distortion is followed by a reduction/elimination of the abnormal behaviour or experience" (p.168). Furthermore, it may also be important to look at whether TSF is a real construct (i.e whether it can be induced experimentally and measured) and if it is specific to EDs or occurs in other disorders as well. Therefore, the following review will begin by outlining how TSF developed as a concept and current ED theory (with a focus on cognitive-behavioural theory, as this holds the largest evidence base to date; National Institute for Clinical Excellence, NICE, 2004) to aid understanding of the role cognitions and disordered eating behaviours play in ED psychopathology and how TSF might relate to them. The review will then discuss whether TSF is a real construct and if it plays a role in ED psychopathology, according to criteria highlighted by Shafran et al. (1999), namely whether TSF is associated with ED psychopathology, whether experimental manipulation of the distortion results in the predicted effects on psychopathology, and whether a reduction/elimination of the distortion is followed by a reduction/elimination of the abnormal behaviour or experience) according to previous research carried out.. Finally, critical appraisal of

research, theory, and implications for treatment will be discussed throughout. Although TSF literature is only just emerging, reviewing it at this stage may highlight methodological issues for investigators to be aware of and help research to move forward, which is fundamentally important to advancing treatments.

A systematic review of the literature was carried out, as these are commonly used to answer well-focused questions about clinical practice, using a more rigorous and well-defined approach than narrative reviews, for example (Cronin, Ryan, & Coughlin, 2008). Literature was searched, using combinations of key search terms in PsycInfo and Medline, via EBSCO and reference lists (see Figure 1 for a flow diagram of how searches were conducted[9]). Inclusion criteria were: articles relevant to TSF in EDs, ED psychopathology, or healthy populations, and those investigating disordered eating behaviours. All genders and ages were included. Exclusion criteria were: articles unavailable in English and those that focused on TSF in disorders other than EDs or disordered eating behaviours. As the criteria to determine whether a cognitive distortion plays a role in a disorder were experimental in nature, only empirical research studies were included; therefore, books and articles that did not contribute anything new to research findings were not included[10]. Fourteen articles were reviewed (see Appendix A).

[9] Other search terms were entered but did not turn up any new results, so were not included in the flow chart. These included: Thought action fusion and eating disorders, thought-shape fusion and anorexia, bulimia, and eating disorders not otherwise specified.

[10] For example, an interview carried out with Jennifer Coelho (Coelho, 2012) was excluded as it did not contribute to answering the following criteria: is the cognitive distortion associated with the psychopathology of the disorder, does experimental manipulation of the distortion results in the predicted effects on psychopathology, and is a reduction/elimination of the distortion followed by a reduction/elimination of the abnormal behaviour or experience? (Shafran et al., 1999)

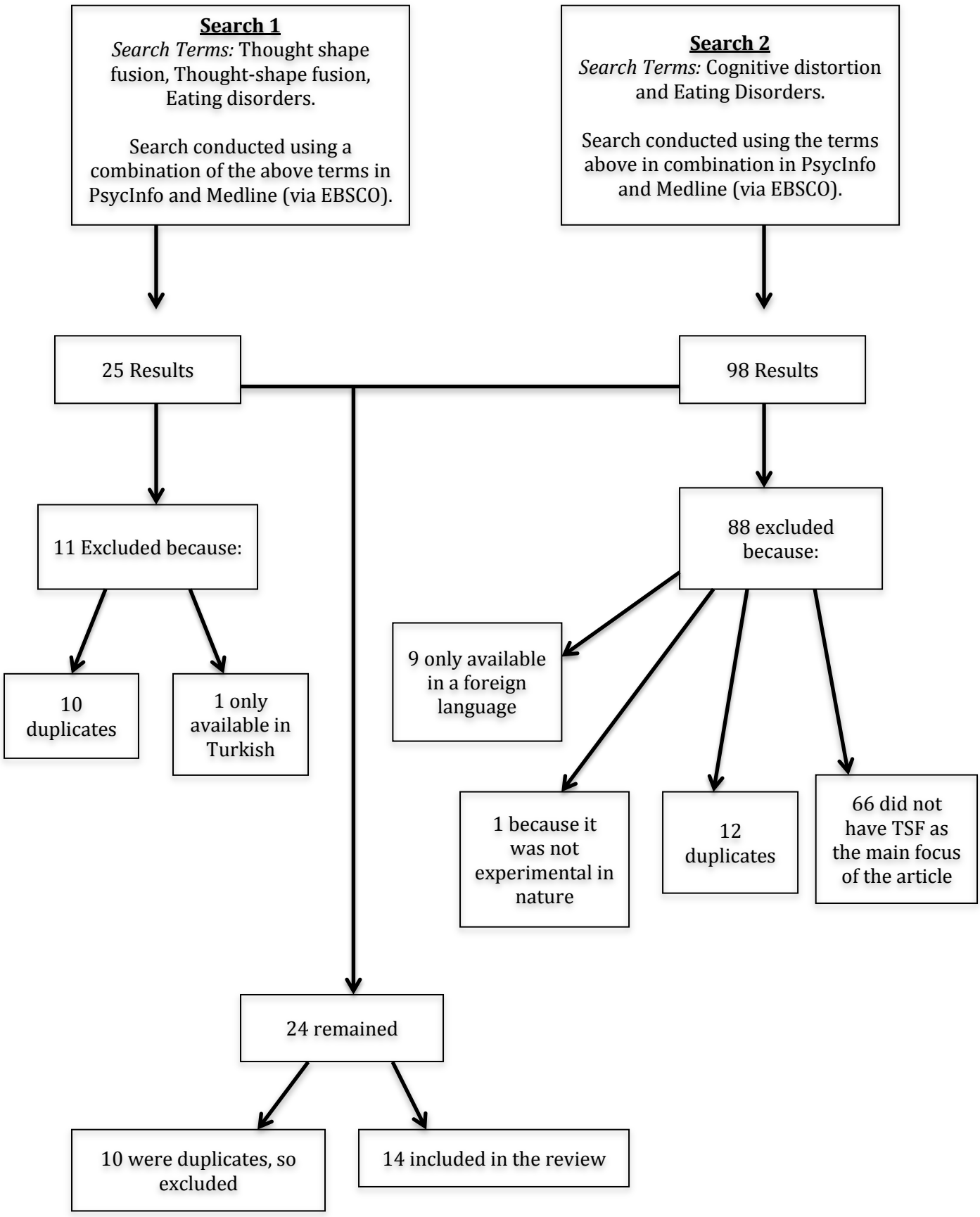

Figure 1. Flow diagram of systematic search for TSF literature.

Development of Thought-Shape Fusion

As mentioned, evidence has shown unusually high levels of co-morbidity exist between OCD and EDs and research has highlighted similarities and differences between them, which may offer some insight into how TSF developed as a concept. Literature varies on the prevalence of co-morbid EDs and OCD; a review by Pearlstein (2002) highlighted studies showing the lifetime prevalence of EDs in people with OCD to lie between 8% and 12%. Speranza et al. (2001) found in a sample of individuals with EDs, the prevalence of OCD was 15.7% and lifetime prevalence was 19.1%, with no significant difference between those with AN and BN.

In terms of the similarities and differences between OCD and EDs, those with OCD commonly alleviate anxiety and distress from intrusive thoughts or urges by trying to suppress or neutralise them with another thought or behaviour (a compulsion; APA, 2000); behaviours seen in EDs may serve a similar function, given that restricted eating and bulimic behaviours may be used for emotion regulation (Swinbourne & Toyz, 2007). Furthermore, both are characterized by fear (of gaining weight in EDs or a catastrophic outcome in OCD) and behaviours such as checking weight, excessive exercise, and counting calories, are obsessional and compulsive in nature (Matsunaga et al., 1999; Milos et al., 2002). However, OCD and EDs are also different in many ways: Swinbourne and Touyz (2007) highlighted that OCD appears more ego-dystonic[11] in nature than EDs, phobic thoughts of food and weight may enter the mind of an individual with an ED but not necessarily against their will, which is dissimilar to the nature of thoughts in those with OCD, and obsessions in those with EDs may be secondary to malnutrition. Thus, a greater understanding of the mechanisms that

[11] I.e. the obsessions and compulsions are not consistent with the person's self-image or self-perception.

underlie both disorders may offer insight into how treatments for those with EDs may be improved or tailored towards those that experience co-morbid EDs and OCD.

As TSF derived from TAF theory, it may be helpful to understand more about TAF and how it relates to OCD psychopathology to understand more about the development of TSF. Evidence has shown TAF specifically relates to obsessionality (Shafran Thordarson, & Rachman, 1996), which as discussed, is also a feature of EDs psychopathology (Fairburn, 2008). According to Salkovskis' (1985) cognitive-behavioural model of OCD, misinterpretation of thoughts (particularly over-inflated sense of responsibility) is a core feature of OCD and may explain TAF. Rachman (1993) stipulated that clients with OCD may fuse their thoughts and actions, meaning they would be more likely to believe thinking about a negative event was equal to the actual event occurring (Frost & Steketee, 2002). This could explain the aetiology and maintenance of OCD, as believing a thought increases the likelihood of a negative event occurring may trigger rituals to prevent it. Individuals may also feel morally wrong for having had the thought, which could increase distress and lead the individual to assign more importance to the thought and their role in preventing the event from occurring (Frost & Steketee, 2002).

Therefore, TAF comprises of two factors: the belief that having an intrusive thought can directly influence the external event related to that thought[12] (likelihood TAF; Shafran & Rachman, 2004) and/or having the thought is morally equivalent to carrying out the event[13] (moral TAF; Shafran & Rachman, 2004). As likelihood and moral TAF have been found to be relevant to other anxiety disorders as well (such as

[12] For example, an individual may believe that having a thought of crashing their car whilst driving would cause their car to crash or make the event more likely to happen (Shafran & Robinson, 2004).

[13] For example, someone may believe that having a thought about pushing someone onto a train track is as morally as bad as actually doing it.

Generalised Anxiety Disorder (GAD; e.g. Abramowitz, Whiteside, Lynam, & Kalsy, 2003)) and due to the similarities between OCD and EDs, Shafran et al. (1999) proposed TSF may also consist of factors paralleling those in TAF. However, possibly due to differences between the conditions, these factors were thought to reflect difficulties specific to EDs. Therefore, TSF was hypothesised to consist of likelihood TSF (the belief that thinking about eating a forbidden food will increase the likelihood of gaining weight or changing shape), and moral TSF (the belief that thinking about eating a forbidden food is morally equivalent to actually eating the food). Shafran et al. (1999) also proposed TSF may consist of an additional factor thought not to be relevant to TAF, which is feeling TSF (the belief that thinking about a forbidden food will increase feelings of fatness). TSF may occur from learning processes, as eating 'fattening' foods can trigger feelings of fatness and fear of weight gain, so if thinking about the food is frequently followed by eating the food, the thought alone may trigger similar feelings (Shafran et al., 1999). Whilst this clarifies how TSF developed as a concept and where similarities with OCD may lie, it is important to explore whether TSF is specific to ED psychopathology and how it may be understood in relation to what it already known about the disorder. Furthermore, to fully explore the clinical implications of TSF and areas in need of further research, it is important first to explore what is known about ED theory,

Cognitive-Behavioural Theory of Eating Disorders

In terms of theoretical approaches to understanding and treating EDs, for adults with AN, BN, and binge-eating disorder (BED; recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of bulimia nervosa; APA, 2000), NICE (2004) recommends cognitive-behaviour therapy (CBT) in the first instance, with BN and BED having a larger evidence base than AN. Unfortunately, little research has looked into effectiveness of psychological treatments for EDNOS.

The transdiagnostic theory of EDs was largely based on cognitive-behavioural theory of BN (Fairburn, 1981) however, despite being the leading treatment for this condition, less than half of patients made a full or lasting recovery (Fairburn, 2008). Therefore, the transdiagnostic theory was developed to address some of the inadequacies and underwent a five-year treatment trial, which showed enhanced CBT for EDs (CBT-E) was more effective than CBT-BN (Fairburn, 2008). Although CBT holds the largest evidence base for treatment, little is known about the role of cognitive distortions, such as TSF, in the theoretical understanding and treatment of EDs. Therefore, the following sections will explore cognitive-behavioural theory of BN and the transdiagnostic theory of EDs in more detail to determine whether cognitive distortions play an important role in ED psychopathology and what other elements may be key to consider.

Cognitive-Behavioural Theory of Bulimia Nervosa

Following discussion around the importance of cognitive distortions in ED psychopathology, a core feature of BN is an unhelpful system of evaluating self-worth, as people with EDs judge themselves largely or solely on eating habits, weight, shape and/or ability to control these factors (Fairburn et al., 2003). Fairburn (2008) argued many other features of EDs stem from this, including dietary restraint, other forms of weight control behaviour, body checking and avoidance behaviours, and preoccupation with thoughts around shape, weight, and eating, showing the impact this bias may have.

According to this theory, binge-eating can occur as a result of cognitive factors and physiological effects of dietary restraint; clients tend to adopt strict and unachievable rules regarding eating, and when broken the outcome is perceived in an extremely negative way. Consequently, the individual temporarily disregards their rules and succumbs to the urge to eat (Fairburn, 2008). Also, low blood sugar levels can trigger strong messages being sent to the brain to increase hunger, which may result in strong urges to binge on high sugar foods (Waller et al., 2007). This initiates a restricting and bingeing pattern, which maintains the core psychopathology by escalating concerns about weight and shape (Fairburn, 2008). Fairburn, Cooper, and Cooper (1986) also suggested such episodes may be triggered by negative mood and adverse life events, which interfere with the ability to continue with dietary restraint; binges also temporarily distract from negative mood states, thus reinforcing the behaviour (Fairburn et al., 2003; see Figure 2).

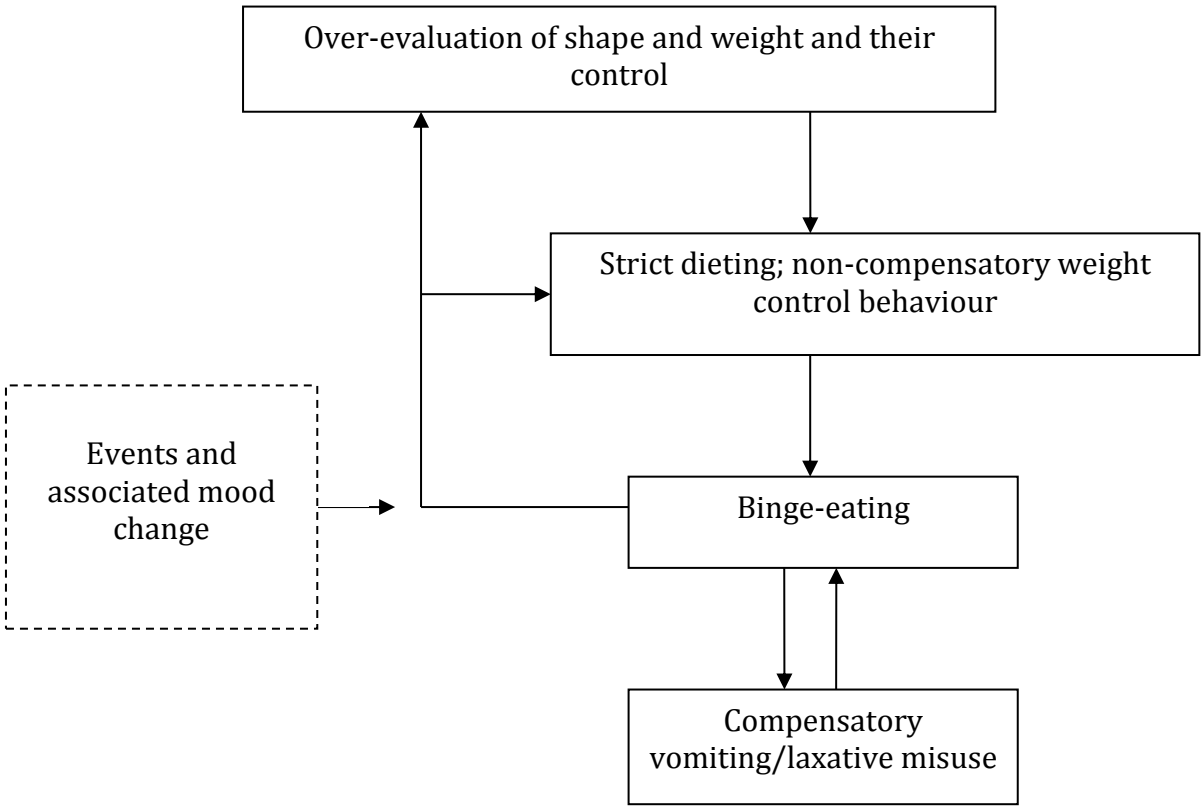

Figure 2. Cognitive-behavioural model of bulimia nervosa (Fairburn, 2008).

As well as the cognitive distortion 'over-evaluation of the importance of weight and shape' having an important role to play, low self-esteem is also thought to feature prominently; clients who are self-critical, set demanding standards and then blame themselves for not achieving them, tend to try harder to succeed in controlling their shape and weight, as this becomes most important to them (Fairburn et al., 2003).

Fairburn et al. (2003) argued that AN and EDNOS share the same core psychopathology as BN, as those with AN also employ rigid rules around restrictive eating, which may lead them to binge and as a result, purge or exercise to compensate (Fairburn, 2008). As many clients migrate between EDs, treatments specifically tailored

to those with AN or BN are not always effective (Waller et al., 2007); therefore, the transdiagnostic theory of EDs combined cognitive-behavioural theories of BN (Figure 2) and AN (Figure 3) to address this issue.

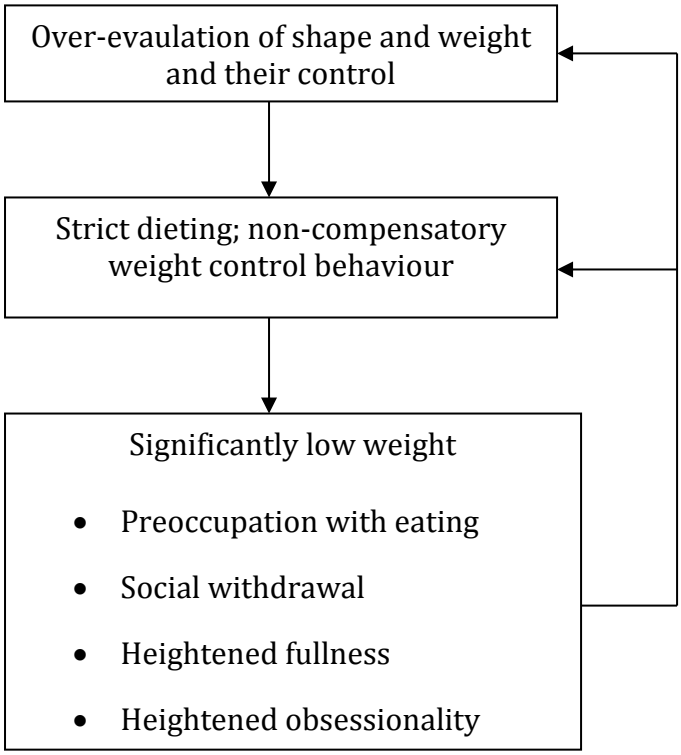

Figure 3. Cognitive-behavioural model of (restricting) anorexia nervosa (Fairburn, 2008)

Transdiagnostic Theory of Eating Disorders

This theory postulates that EDs occur from a combination of cognitive, interpersonal, and behavioural factors (Fairburn et al., 2003), highlighting a role for cognitive distortions. Fairburn et al. (2003) also suggested one or more of four additional maintaining processes interact with those in Figures 2 and 3: clinical perfectionism, low self-esteem, difficulty coping with intense moods, and/or interpersonal difficulties. Difficulty coping with intense moods also appears to play a significant role in ED

psychopathology and could also relate to cognitive processes. The intolerance of any mood state leads to "dysfunctional mood modulatory behaviour", which temporarily reduces the impact and awareness of the mood state, but at a personal cost (Fairburn et al., 2003, p.517)[14]. Cognitive processes may amplify mood states (Fairburn et al., 2003), thus TSF may play a role here, which will be discussed later (see Figure 4 for a diagram of the transdiagnostic theory of EDs).

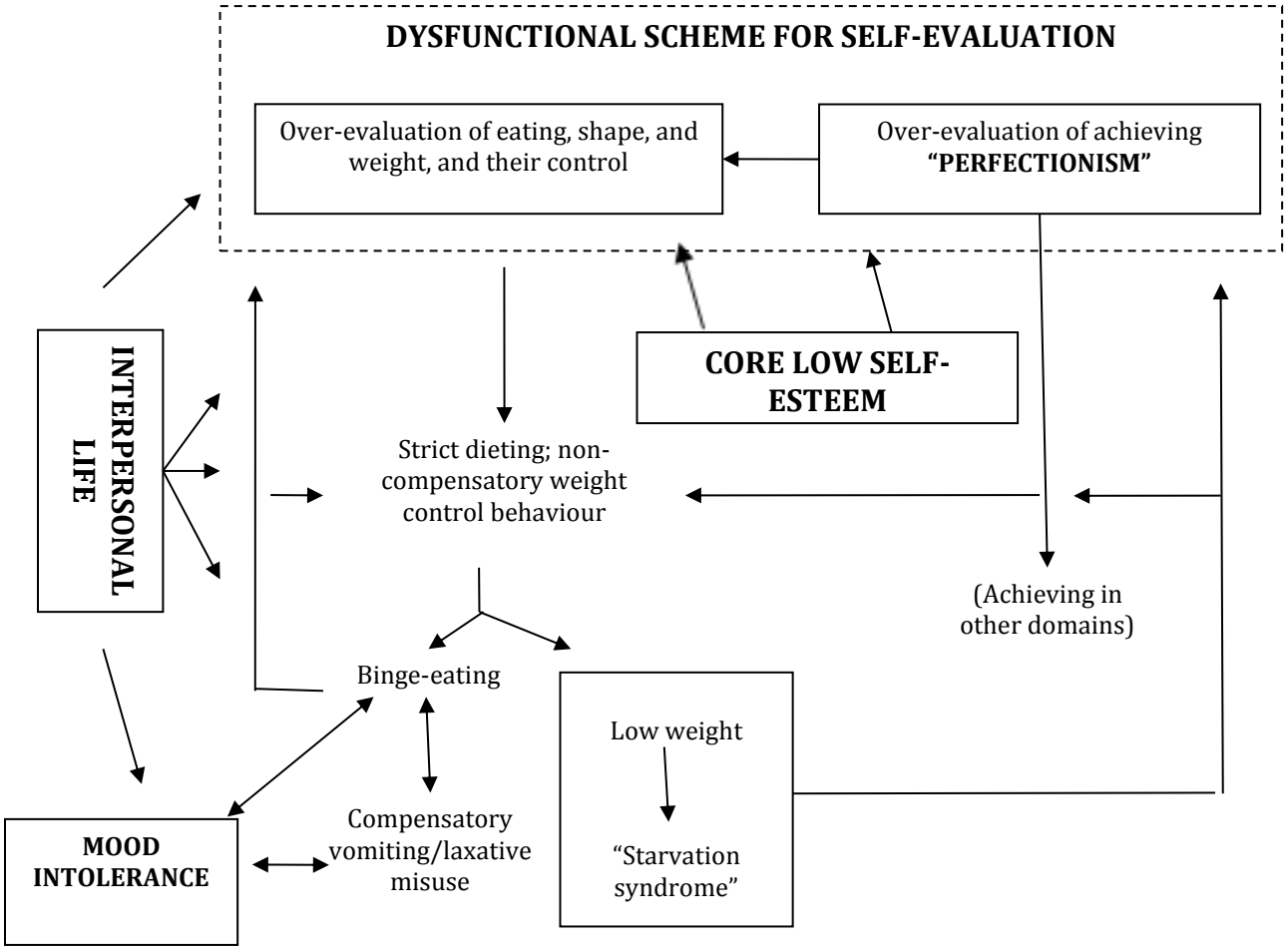

Figure 4. The transdiagnostic theory of eating disorders (Fairburn et al., 2003).

[14] Examples of these behaviours may include using alcohol, self-harm, excessive exercise, or binge-eating as a means of mood modulation (Fairburn et al., 2003).

Therefore, cognitive bias features prominently in EDs theory, which Shafran et al. (1999) argued can maintain unhelpful behaviours; this means it is important to understand the role TSF plays in EDs, as it could also be a key causal or maintaining factor. To determine whether it does play a role, one needs first to consider whether TSF is associated with ED psychopathology (Shafran et al., 1999).

Is Thought-Shape Fusion Associated with Eating Disorder Psychopathology?

Although research into TSF is still emerging, studies have investigated whether TSF is associated with ED psychopathology (Coelho, Jansen, & Bouvard, 2012b; Coelho, Roefs, & Jansen, 2010; Kostopoulou, Varsou, & Stalikas, 2011; Radomsky et al., 2002; Shafran & Robinson, 2004; Shafran et al., 1999). Before reviewing the findings, it is important to consider how TSF was measured to ensure reliability and validity of outcomes.

Measures of Thought-Shape Fusion

Shafran et al. (1999) developed the Thought-Shape Fusion Questionnaire (TSFQ), consisting of 34 items, measuring TSF concept[15] and interpretation[16]. TSF concept should be measured as one factor, as the domains did not statistically differentiate into separate factors. The questionnaire has been shown to be valid and reliable (Shafran et al., 1999; Shafran & Robinson, 2004).

When many of the studies that will be discussed were carried out, this was the only questionnaire validated to measure TSF. However, some authors discussed 'state' and 'trait' TSF rather than TSF concept and interpretation, which were measured through a State Thought-Shape Fusion scale (S-TSF; Coelho et al., 2010) or by using Visual Analogue Scales (VAS) to determine degree of likelihood of weight gain, feelings of fatness, moral wrongdoing, anxiety, and guilt (Coelho, Bayens, Purdon, Pitet, & Bouvard, 2012a; Coelho et al., 2010, 2012b, 2012c; Jauregui-Lobera et al., 2011a).

[15] Thought-shape fusion concept consists of 17 items measuring the three domains of TSF: likelihood, feeling, and moral (Shafran et al., 1999).

[16] Thought-shape fusion interpretation consists of 17 items measuring interpretation of thinking about eating a 'forbidden' or 'fattening' food, for example "I am a pig" or "I am out of control" (Shafran & Robinson, 2004, p.402).

Authors also determined changes in perceived likelihood of weight gain through measuring estimated weight before and after TSF was induced (Coelho et al., 2010, 2012b). Whilst measuring individual factors in TSF is helpful, it is important to consider how reliable and valid these measures were. Of those who used the S-TSF Scale, many reported different numbers of questions (from five to seven) scored on a visual analogue scale (Coelho et al., 2010, 2012a, 2012b, 2012c; Jauregui-Lobera et al., 2011a), with Cronbach's alphas ranging from .69-.90 for adults (Coelho et al., 2010, 2012a, 2012b) and adolescents (Coelho et al., 2012c) depending on how many items were used. This demonstrates some variation in reliability. More recently, Coelho et al. (2013) validated the Trait TSF scale, as they believed the TSFQ was too long for clinical use. They reduced the scale from 34 to 14 items measuring TSF concept only and introduced four items measuring the clinical importance of TSF (frequency and impact of the thoughts, importance of suppression, and uncontrollability). Cronbach's alpha for the 14-item scale was .92 and .93 in adults for the additional items (Coelho et al., 2013) and .90 for a 14-item scale (with adapted language to suit level of understanding) in adolescents (Coelho et al., 2012c). The scale also demonstrated high convergent validity with eating pathology and internal consistency (Coelho et al., 2013). Therefore, findings from studies that used the Trait TSF scale have to some degree been shown to be reliable and valid; however, Coelho et al. (2013) also noted that further validation is needed for the full 18-item scale due to a limited sample size.

Although Coelho et al. (2010) described state TSF as being associated with feelings of anxiety, guilt, fatness, perceived weight gain and/or moral wrongdoing and trait TSF as a general tendency towards TSF-related thoughts, these definitions have not been reported elsewhere, meaning there appears to be no consistent definition of these terms (e.g. Coelho et al., 2010; Jauregui-Lobera et al., 2011a). Furthermore, there have

not been any studies that have validated the S-TSF scale, making it difficult to ensure the same concept has been measured throughout. Furthermore, studies have been carried out in various countries (for example, the Netherlands (Coelho et al., 2010), Spain (e.g. Jauregui-Lobera et al., 2011a), Greece (Kostopoulou et al., 2011), and France (Coelho et al., 2012a, 2013). Although Jauregui-Lobera, Santed, Shafran, Santiago, & Estebanez (2012b) validated the TSFQ in Spanish and Coelho et al. (2013) validated the Trait TSF scale in French, they have not been validated in other languages. Therefore, the findings discussed in this review may not all be robust; however, they may still offer insight into the role of TSF in EDs. State and trait TSF will be discussed but will not be considered a core feature or measure of TSF due to lack of consistency and understanding of the constructs.

Association Between Thought-Shape Fusion and Eating Disorder Psychopathology

To determine whether an association has been found between TSF and ED psychopathology, the articles were reviewed to see primarily if TSF correlated with ED psychopathology in experimental investigations and questionnaire studies and whether features of TSF have been detected in clinical samples compared with non-clinical samples. Of the fourteen articles reviewed, eight looked at whether TSF (as measured by the TSFQ or S-TSF scale) correlated with ED psychopathology, according to the Eating Disorders Examination Questionnaire EDE-Q (Fairburn & Beglin, 1994; Coelho, Carter, McFarlane, & Polivy, 2008a; Coelho et al., 2012a; Shafran & Robinson, 2004; Shafran et al., 1999), Eating Disorders Inventory-2 (EDI-2; Garner, 1991; Jauregui-Lobera, Bolanos-Rios, & Ruiz-Prieto, 2012a, Jauregui-Lobera et al., 2012b), or Eating Attitudes Test (EAT; Garner & Garfinkel, 1979; Coelho et al., 2012c). Coelho et al. (2013)

did look at whether TSF correlated with ED pathology, however this was secondary to validating the Trait TSF scale. Finally, three articles also investigated whether features of TSF were present in clinical samples, without explicitly measuring an association between TSF and ED psychopathology using standardized questionnaires (Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002). Whilst some of these studies used randomized control trial (RCT) methodology (Coelho et al., 2008, 2012a; 2012c; Jauregui-Lobera et al., 2011a) meaning effects observed may more likely be due to variables manipulated in the trial (i.e. TSF), more of the studies did not use a control group or manipulate TSF (Coelho et al., 2013; Jauregui-Lobera et al., 2012a, 2012b; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999; Shafran & Robinson, 2004). Thus, although many of the results described may demonstrate associations and differences between groups, one cannot infer any causal relationships. Furthermore, many of the studies reported small sample sizes, which may have led to them being underpowered (Coelho et al., 2008a, 2012a, 2013; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran & Robinson, 2004).

When looking at the association between TSF and ED psychopathology in healthy samples, all found a significant association, apart from Jauregui-Lobera et al. (2012b) who found none between TSF interpretation and ED psychopathology (according to subscales of the EDI-2[17]) in students, nor did they find significant associations between TSF concept or total TSF and the bulimia subscale of the EDI-2. However, for participants with EDs, both subscales of the TSFQ correlated significantly with the EDI-2, which supports the association between TSF and ED psychopathology in a clinical sample. It is possible that the non-significant findings in these studies could be explained by TSF occurring on a continuum, with healthy samples experiencing TSF to a

[17] Drive for thinness, Bulimia, and Body dissatisfaction (Garner, 1991).

lesser extent than those with clinical EDs. However, the findings may also suggest TSF concept may play more of a key role in BN, though further research is needed to investigate these ideas further.

Shafran and Robinson (2004) also found no significant associations between TSF interpretation and the restraint subscale of the EDE-Q or concerns about shape in those without an ED, whereas they were significantly associated in those with EDs. Therefore, TSF interpretation may play more of a role in eating restraint for those with EDs than those without; it is possible that TSF interpretation may tap into the role of low self-esteem in EDs, as thoughts such as "I am a pig" (an example of one of the items measured on the TSFQ) may reflect negative self-beliefs, thus future research may wish to investigate associations between TSF and low self-esteem.

Interestingly, when investigating the association between TSF and ED psychopathology in clinical samples, some found significant associations between TSF and all subscales on the EDE-Q or EDI-2, which remained significant when controlling for depression (Coelho et al., 2008a, 2012a; Jauregui-Lobera et al., 2012a, 2012b; Shafran & Robinson, 2004). However, Shafran and Robinson (2004) found that TSF was no longer significantly associated with body checking and avoidance when controlling for depression. They suggested this could be due to the urge to check one's shape, as TSF may be harder to resist when low in mood. They also found when controlling for depression similar to those without an ED, TSF concept and weight concerns, and TSF interpretation and restraint were no longer significantly associated in those with EDs (Shafran & Robinson, 2004). It is possible that low mood leads to more negative interpretation of thoughts, which may break down dietary restraint (Shafran & Robinson, 2004). Studies have also shown TSF and depression to significantly correlate in people with and without EDs (e.g. Coelho et al., 2010; Jauregui-Lobera et al., 2011a;

Radomsky et al., 2002; Shafran & Robinson, 2004) and some reported lower mood after a TSF induction compared with no changes in affect after a control induction (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a). Therefore, these findings may suggest TSF lowers mood, which may have important clinical implications. As many studies have also reported a close link between depression and EDs (e.g. Guillen et al., 2012; Mischoulon et al., 2011; Pollice, Kaye, Greeno, & Weltzin, 1997), it is important to consider controlling for these symptoms, as they may confound TSF findings (Shafran et al., 1999).

Unlike the studies discussed so far, some researchers did not explicitly look at correlations between TSF and ED psychopathology according to a standardised questionnaire, such as the EDE-Q; however, Radomsky et al. (2002) still found TSF exists in a sample of people with AN, as they demonstrated high feelings of fatness, moral wrongdoing, and perceived likelihood of weight gain, after experiencing a TSF induction, which are all features of the cognitive distortion (Shafran et al., 1999). Similarly, Jauregui-Lobera et al. (2011a) found higher state and trait TSF in those with EDs compared with healthy controls. Interestingly, Kostopoulou et al. (2011) also found those with BN who experienced TSF reported more body dissatisfaction, which is thought to be an important factor in the maintenance of ED psychopathology (Waller et al., 2007). However, body dissatisfaction (dislike of one's appearance) is quite common in the general population and is different from over-evaluation of weight and shape (judging one's self-worth largely or solely on shape and weight), which features more in the maintenance of ED psychopathology (Fairburn, 2008).

Finally, Coelho et al. (2012b) found after a TSF induction, normal weight participants reported significantly greater value in dieting[18] compared with a control group, whereas those who were overweight did not. This suggests those who are overweight may be less susceptible to TSF, whereas TSF may impact upon urges to reduce food intake in normal weight individuals. Coelho et al. (2012c) supported this after studying TSF in obese and normal weight adolescents; they found that obese individuals were less susceptible to a TSF induction and obesity did not predict trait TSF. However, the study also showed that TSF could be induced in normal weight adolescents, suggesting the cognitive distortion may be present in this sample as well.

Therefore, these findings seem to support an association between TSF and ED psychopathology in adults and adolescents, both with and without an ED (perhaps to a lesser extent in those without). However, evidence suggests those who are overweight may be less susceptible to TSF than those who are of normal weight. Furthermore, associations may only exist between some features of TSF and ED psychopathology; in particular it is unclear whether TSF is significantly associated with weight concerns and restraint. It is also unclear whether significant findings were due to TSF or symptoms of depression (Shafran et al., 1999; Shafran & Robinson, 2004). Finally, it is not always clear in which direction and to what extent the association exists, nor whether TSF can be induced experimentally; therefore, this will be explored further.

[18] Value in dieting was a 6-item measure, looking at the extent to which participants found the following important: losing weight, dieting, devoting efforts to eating less, maintaining a diet whilst others around them are eating unhealthy foods, being thin, and overcoming urges to eat unhealthy foods (Coelho et al., 2012b).

Does Manipulation of Thought-Shape Fusion Lead to Predicted Effects on Eating Disorder Psychopathology?

The second criterion Shafran et al. (1999) proposed is necessary to explore to determine whether TSF plays a role in a disorder, is whether experimental manipulation of the distortion results in the predicted effects on psychopathology. Shafran et al. (1999) suggested that if TSF was induced experimentally, then thinking about a 'forbidden' or 'fattening' food would increase perceived likelihood of weight gain, feelings of moral wrongdoing, feelings of fatness, anxiety, guilt, and an urge to perform a corrective behaviour. They also predicted that carrying out a corrective behaviour would reduce the effects of the experiment. Therefore, it was hypothesised that experimental manipulation of TSF would lead to predicted effects on ED psychopathology; the following section will review whether experimental studies have supported this.

Nine of the 14 articles reviewed outlined experimental studies that induced TSF either in healthy samples (Shafran et al., 1999), clinical samples (Kostopoulou et al., 2011; Radomsky et al., 2002), or both through RCTs. Those with a clinical ED and healthy samples were randomly allocated to a TSF or control condition and in some cases, an anxiety or food-cue exposure condition as well (Coelho et al., 2008a, 2010, 2012a, 2012b, & 2012c; Jauregui-Lobera et al., 2011). In addition to the limitations mentioned in the previous section, it is important to note that many of these studies have not explored differences between AN, BN, or EDNOS, thus it is unclear whether differences exist between subgroups (e.g. Coelho et al., 2008a), which may have implications for treatment. Nonetheless, most studies used similar methodology to induce TSF, which means findings are easily comparable. However, methodological

errors may also exist and could be repeated in future research if not considered early on. Therefore, these will be explored in the next section.

Experimental Manipulation of Thought-Shape Fusion

The procedure for inducing TSF was based on that by Shafran et al. (1999); they asked participants to think of a 'fattening' or 'forbidden' food, or one that was likely to make them gain weight if they ate it. Participants completed the sentence, "I am eating _____", filling in the blank with the name of the food, and thought about eating large quantities of it until it was unpleasant for them and in some cases, until their anxiety had increased by 20 points on a Verbal Analogue Scale from 0 (not at all) to 100 (extremely high; Shafran et al., 1999). Baseline and post-experimental induction ratings were taken of anxiety and guilt. Therefore, anxiety ratings may have been biased, as participants were *instructed* to feel anxious and only those who were anxious remained in the study (Shafran et al., 1999). This methodological bias may have been repeated in other studies (e.g. Kostopoulou et al., 2011). However, later studies asked participants to think about food more vividly by considering taste, colour, texture, etc., to ensure images of the food were fully experienced (e.g. Radomsky et al., 2002), which has been a more positive development.

Participants were also asked to report their estimated weight, how fat they felt, and complete questionnaires according to the aims and hypotheses of the study (see Appendix A). Shafran et al. (1999) also provided an opportunity for participants to neutralize the effects of the procedure or perform a corrective behavior (such as crossing out the sentence relating to a forbidden food, imagining exercising, imagining eating celery, or checking their shape in a mirror), which was recorded by the

experimenter. As mentioned, other studies induced TSF in a similar way, though with some variation according to the aim of the study (Coelho et al., 2008a, 2010, 2012a, 2012b; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002). Some used control conditions, neutral conditions, or other experimental design conditions, which participants were randomly assigned to (Coelho et al., 2008a, 2010, 2012a, 2012b; Jauregui-Lobera et al., 2011a). The findings of these studies will now be explored to see whether manipulating TSF led to changes in thoughts, feelings, and behaviours, relevant to ED psychopathology.

Impact of Thought-Shape Fusion on Perceived Likelihood of Weight Gain.

To meet DSM-IV-TR[19] (APA, 2000) criteria for an ED, an individual must show concern about their shape and/or weight and the transdiagnostic model of EDs (Fariburn et al., 2003) discussed earlier highlighted the importance of this area in ED psychopathology. Fairburn (2008) explains how such individuals often become preoccupied with weight gain and any slight changes in shape. Consequently, many frequently weigh themselves or check their bodies, which heightens their sensitivity to trivial changes. Others may avoid their weight or looking at themselves but assume they look fat (Fairburn, 2008). Therefore, if TSF were to increase perceived likelihood of weight gain, this may trigger an urge to carry out compensatory or checking behaviours, which may maintain ED psychopathology.

[19] Changes to diagnostic criteria for AN and BN have been proposed for DSM-V (which is due to be published in 2013). For example, it has been proposed that wording such as "leading to body weight less than 85% of that expected" will be changed to "restriction of energy intake [leading to] markedly low weight" and amenorrhea will no longer be necessary for a diagnosis of AN ("Anticipated DSM-V changes", 2010). Also the binge-eating and unhelpful compensatory behaviour frequency needed for a diagnosis of BN may be reduced from at least two times a week for three months, to at least once a week for three months ("Anticipated DSM-V changes", 2010). It should be noted these are only proposals at this stage so further changes may be made.

Seven of the articles that induced TSF experimentally reported findings on increased likelihood of weight gain in undergraduate students (Coelho et al., 2010; Shafran et al., 1999), participants with EDs (Kostopoulou et al., 2011; Radomsky et al., 2002) or participants with EDs and healthy controls (Coelho et al., 2008a, 2012b; Jauregui-Lobera et al., 2011a). All randomly allocated participants to induction conditions, except Kostopoulou et al. (2011), Radomsky et al. (2002), and Shafran et al. (1999), who measured changes pre and post induction in a single sample.

The studies showed mixed findings regarding whether TSF leads to greater perceived likelihood of weight gain. Initially it appeared evidence was fairly evenly split in showing either a significant increase in perceived likelihood of weight gain after a TSF induction (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a; Radomsky et al., 2002; Shafran et al., 1999) or no significant changes (Coelho et al., 2008a, 2010, 2012b; Kostopoulou et al., 2011). However, upon closer examination, the study by Radomsky et al. (2002) reported a mean estimate of 24% likelihood of weight gain after the TSF induction, but it was unclear whether this increase was significant. Nonetheless, they did find that after neutralising the effects of the experiment, perceived likelihood of weight gain significantly reduced. Neutralising or checking behaviours are thought to maintain cognitive distortions by offering short-term emotional relief, and preventing the discovery that beliefs may not be accurate (Kostopoulou et al., 2011). As perceived likelihood of weight gain is considered to be a trigger for negative emotions (such as anxiety and low mood (Fairburn et al., 2003), it is possible that a reduction in perceived likelihood of weight gain from a neutralising behaviour may also lead to a short-term reduction in negative emotions (this will be explored further later). This may negatively reinforce the behaviour and suggests increases in perceived likelihood of weight gain could trigger neutralising behaviours as well.

Furthermore, Coelho et al. (2008a) reported a marginally significant main effect of induction condition on likelihood of weight gain, with those in a TSF induction showing significantly higher perceived likelihood of weight gain than a control group; however, reported significance levels were $p \leq .08$, which is above the recommended value of .05 (Field, 2005). Interestingly, unrestrained eaters (but not restrained eaters) also showed significantly higher perceived likelihood of weight gain after the TSF induction compared to a control group, which the authors suggest may be due to restrained eaters using thought control strategies (such as thought suppression) to avoid engaging in the induction (Coelho et al., 2008a). Therefore, thought suppression may be an important factor to consider in future research. Also, some of those who found no significant changes used small sample sizes, meaning their findings could have been underpowered (Coelho et al., 2010; Kostopoulou et al., 2011).

Conversely, Jauregui-Lobera et al. (2011a) reported a significant interaction between induction and group, with those with an ED reporting higher perceived likelihood of weight gain after a TSF induction than those in an anxiety or control induction (for further details of these conditions, please see Appendix A), which supports the hypothesis that inducing TSF would lead to higher perceived likelihood of weight gain for those with EDs. However, other studies did not find any significant differences between those with an ED and those without (Coelho et al., 2010, 2012b), and Coelho et al. (2008a) found no significant changes in perceived likelihood of weight gain after a TSF induction, control induction, or anxiety induction for ED participants. Thus, perhaps the relationship between TSF and perceived likelihood of weight gain may not be specific to ED difficulties and manipulating TSF may not have had a great impact on perceived likelihood of weight gain in those with EDs. Interestingly, they also found that restrained eaters (compared to unrestrained eaters) reported significantly

higher perceived likelihood of weight gain after an anxiety induction, compared to a TSF, or control induction, which perhaps supports the idea that restrained eaters may have used thought control strategies during the TSF induction. Alternatively, anxiety or low mood may result in the individual focusing more on the parts of the body they do not like (Beck, 2002), thus *concern* around perceived likelihood of weight gain may trigger unhelpful behaviours to reduce anxiety, such as checking shape and weight or restricting food intake (Fairburn, 2008). It also possible that those who feel confident in their ability to restrict eating later may feel confident they will not put on weight (Shafran et al., 1999). However, Shafran et al. (1999) stipulated individuals who experience TSF are logically aware that thoughts alone cannot lead to weight gain or changes in shape, rather they feel it on an emotional level. Therefore, estimating likelihood of weight gain verbally in an experiment may not be reliable if participants report what they think rationally rather than emotionally.

Overall, it seems little evidence suggests that manipulating TSF increases perceived likelihood of weight gain in those with EDs, which is surprising considering over-evaluation of weight and shape is thought to be a key maintaining factor of the disorder (Fairburn et al., 2003). However, it is possible that those who show disordered eating behaviours, such as restricted eating may use thought control strategies to manage anxiety relating to thinking about food. Therefore, it may be helpful for studies in the future to investigate causal relationships between these variables and to look at effects of thought suppression and TSF on disordered eating behaviours and cognitions.

Impact of Thought-Shape Fusion on Feelings of Fatness

Many clients with EDs often report "feeling fat", which some equate with being fat regardless of their true shape or weight (Fairburn, 2008, p.12). Many also view feeling full as evidence they are fat and may restrict eating or purge to avoid this feeling; thus, feeling fat appears to reflect over-concern about shape and weight (Fairburn, 2008) and has been predicted to increase after inducing TSF (Shafran et al., 1999).

Seven of the nine articles that induced TSF experimentally looked at whether inducing TSF would increase feelings of fatness in those with and without EDs (Coelho et al., 2008a, 2010, 2012b; Kostopoulou et al., 2011; Jauregui-Lobera et al., 2011a; Radomsky et al., 2002; and Shafran et al., 1999); findings appear to show that it does, perhaps more consistently than those regarding perceived likelihood of weight gain (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a; Radomsky et al., 2002; Shafran et al., 1999). One article (Kostopoulou et al., 2011) reported no significant changes in feelings of fatness after a TSF induction for those with BN. However, along with studies by Radomsky et al. (2002) and Shafran et al. (1999), Kostopoulou et al. (2011) found a positive correlational trend in those with AN, BN, and healthy participants and significant reductions in feelings of fatness after neutralising behaviours were carried out. Therefore, perhaps findings would have reached significance in the study by Kostopoulou et al. (2011) if they had used a larger sample size (rather than 20 participants).

When comparing patients with an ED to a control group after a TSF induction, anxiety induction, or control induction, Coelho et al. (2008a) and Jauregui-Lobera et al. (2011a) found a significant main effect of induction condition on reported feelings of fatness, with those in the TSF condition reporting significantly greater feelings of

fatness than those in the anxiety or control conditions, again suggesting manipulating TSF does have an effect. However, findings were less clear regarding groups, as Coelho et al. (2008a) found those with a clinical ED reported higher feelings of fatness after the TSF induction than unrestrained eaters, but they were not significantly different to restrained eaters. This is perhaps unsurprising, as although those with disordered eating behaviours may not meet full criteria for an ED, they may share similar concerns to those who do. However, Jauregui-Lobera et al. (2011a) reported no significant differences in feelings of fatness between those with or without an ED after a TSF induction. This could imply that feelings of fatness can increase as a result of TSF regardless of whether people have a clinical ED.

As mentioned, feeling full is also important in ED psychopathology (Fairburn, 2008) and has been found to be a feature of Functional Dyspepsia (FD). FD is a complex physiological disorder relating to stomach motility (for example delayed gastric emptying or hypersensitivity to gastric distension; Jauregui-Lobera, Santed, & Bolanos-Rios. 2011b), but most commonly it presents as epigastric pain or burning, fullness, and early satiation after meals, all of which are commonly seen in individuals with EDs (Jauregui-Lobera et al., 2011b). Interestingly, Jauregui-Lobera et al. (2011b) investigated the relationship between TSF, FD, and quality of life (QoL) in people with EDs, other psychiatric disorders (anxiety, depression, and adaptive disorders), and students (all with symptoms of FD[20]; see Appendix B). Participants were given measures to assess severity of FD, TSF, anxiety, depression, and QoL (see Appendix A). The results showed no significant differences in FD symptoms between the groups, other than bloating and feelings satiated, which was significantly higher among patients with EDs (Jauregui-Lobera et al., 2011b). Interestingly, correlations between FD and

[20] FD was diagnosed according to ROME III criteria (Rome Foundation, 2012)

TSF were initially significant for all groups, however they only remained significant for the ED group after controlling for anxiety and depression. For this group, TSF significantly correlated most with symptoms of bloating, a diffuse painful feeling, nausea, and total dyspepsia score (Jauregui-Lobera et al., 2011b).

This suggests that for those with EDs, TSF may also relate to feeling full. It also significantly correlated with nausea (Jauregui-Lobera et al., 2011b), which can often trigger purging. Furthermore, Jauregui-Lobera et al. (2011b) suggest anxiety and distress (from self-criticism) are capable of producing abdominal symptoms, which may support the notion by Fairburn (2008) that feeling fat could occur as a result of mislabelling emotions and body experiences. This again supports the need for further research into the role of self-esteem in TSF. There is notable prevalence of these complaints among ED patients[21] (Jauregui-Lobera et al., 2011b) and TSF was also shown to predict QoL in patients with EDs and FD, meaning this could warrant treatment. However, correlations do not determine causality and as TSF was not induced experimentally, more research is needed to see whether increasing TSF would increase feelings of fullness and how this would relate to compensatory behaviours. Nonetheless, manipulating TSF does seem to increase feelings of fatness, especially in those with EDs or disordered eating behaviours.

Impact of Thought-Shape Fusion on Feelings of Moral Wrongdoing

Eight of the nine studies that induced TSF experimentally investigated feelings of moral wrongdoing following the induction (Coelho et al., 2008a, 2010, 2012a, 2012b; Jauregui-

[21] 66% present with symptoms such as gastric/abdominal fullness, and 75% of bulimic patients report abdominal distention (Jauregui-Lobera et al., 2011b)

Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). Shafran et al. (1999) hypothesized inducing TSF in participants would increase feelings of moral wrongdoing, which research appears to support (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). Currently, there is little insight into this concept in EDs and how it might relate to emotions or behaviours, however Frost and Steketee (2002) suggest in OCD, moral TAF may lead to greater distress, as individuals may perceive themselves as being a 'bad' person for having had a thought. Thus, feelings of moral wrongdoing may relate to feelings of guilt, low mood, or low self-esteem in EDs. Furthermore, Kostopoulou et al. (2011) suggested in those with BN, feelings of moral wrongdoing could threaten the individual's self-image, which may trigger a bulimic episode.

Some studies did investigate whether feelings of moral wrongdoing increased after a TSF induction, however the findings were not always reported (Coelho et al., 2010, 2012a, 2012b), which could be due to having investigated state TSF as a single construct, or because there were no significant findings to report. Nonetheless, unlike the other constructs, none of the studies investigating feelings of moral wrongdoing after a TSF induction reported non-significant changes and these feelings seemed to increase post-induction.

In clients with EDs and healthy participants, the results clearly showed a high sense of moral unacceptability of thinking about a forbidden food after a TSF induction (Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). The remaining studies looked at differences between conditions (a TSF induction, anxiety induction, or control induction) and groups (those with an eating ED and those without). Coelho et al. (2008a) and Jauregui-Lobera et al. (2011a) found a significant main effect of induction condition, with those in the TSF induction reporting a higher sense of moral

wrongdoing, compared with those in the anxiety or control induction. There was also a significant main effect of participant group; Coelho et al. (2008a) found those with EDs reported a higher sense of moral-wrong doing than restrained or unrestrained eaters. Reports of moral wrongdoing were also higher for those with EDs and unrestrained eaters after the TSF condition, compared with the anxiety or control condition (Coelho et al., 2008a). Interestingly though, restrained eaters reported higher moral wrongdoing after the anxiety condition (Coelho et al., 2008a), which again could be due to thought control strategies being used in the TSF condition. Similar findings were reported by Jauregui-Lobera et al. (2011a), whereby patients with an ED reported higher levels of moral wrongdoing than those without, however it was not reported whether this was true after the TSF induction compared with the anxiety or control inductions, so the effect may be due to those with an ED having a higher sense of moral wrongdoing anyway, rather than as a result of TSF.

Overall, these studies imply that inducing TSF leads to greater feelings of moral wrongdoing, more so for those with an ED than without. However, little is known about the role this plays in ED psychopathology; it would be important to explore this further, as it appears to be more specific to those with an ED than feelings of fatness or perceived likelihood of weight gain, which occur more in healthy participants as well. So far, it may have been unsurprising that evidence shows inducing TSF experimentally leads to increases in feelings of fatness, moral wrongdoing and perceived likelihood of weight gain, as these are thought to be core features of the construct. What needs to be explored further is whether inducing TSF leads to increases in other factors relevant to ED psychopathology as well.

Impact of Thought-Shape Fusion on Anxiety and Guilt.

Five articles investigated changes in anxiety and guilt following a TSF induction (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). Shafran et al. (1999) again hypothesised that manipulating TSF would lead to an increase in these emotions, which research supports (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). As discussed, cognitive processes are thought to amplify mood states, which those with EDs may find difficult to manage. Thus, some look to unhelpful behaviours to alleviate distress (Fairburn et al., 2003). Unfortunately, there is no suggestion of what these emotions might relate to, however anxiety may relate to fear of gaining weight and feelings of fatness, whereas guilt may stem from feelings of moral wrongdoing. Overall, the findings showed a significant increase in anxiety and guilt after a TSF induction, for participants with EDs (Coelho et al., 2008a; Kostopoulou et al., 2011; Radomsky et al., 2002) and without (Shafran et al., 1999).

When looking at these findings in more detail, the RCTs containing participants with and without EDs, showed significant main effects of induction condition (anxiety, TSF, or control inductions) on guilt and anxiety, with guilt levels being significantly higher for participants after a TSF induction compared with the other conditions, and anxiety levels being highest after the anxiety induction, followed by the TSF, then control induction (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a). These studies also found a significant main effect of participant group on anxiety and guilt, with those with EDs reporting significantly more anxiety and guilt than non-clinical participants (Coelho et al., 2008a; Jauregui-Lobera et al., 2011a). Coelho et al. (2008a) found that participants with EDs reported significantly higher anxiety compared with restrained

and unrestrained eaters after a TSF induction, suggesting TSF may lead to greater anxiety for those with EDs compared with disordered eating behaviours.

Interestingly, in the same study participants with EDs and unrestrained eaters showed significantly higher levels of guilt after a TSF induction, compared to those in the control or anxiety induction. However, restrained eaters did not show significant changes in either anxiety or guilt between any of the conditions (Coelho et al., 2008a). This may further support Coelho et al.'s (2008a) argument that TSF was not fully induced in restrained eaters, however they may also experience lower anxiety in the short-term due to controlling their eating, which may change if they are unable to continue this long term. Finally, those who carried out neutralising or checking behaviours after the TSF induction also noticed a significant decrease in anxiety and guilt (Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). Therefore, as mentioned these emotions could drive an urge to carry out a neutralising/checking behaviour. However, Coelho et al. (2008a) argued that the TSF induction in their study resulted in more neutralization than the anxiety induction, which suggests the behavioural changes may be specific to thinking about eating fattening foods, rather than anxiety-related thoughts in general. However, thinking about eating a fattening food may also increase anxiety more in those with an ED than other anxiety thoughts. Nonetheless, it appears that inducing TSF increases anxiety and guilt in those with EDs, however little is known about what these feelings relate to. Also, neutralising and checking behaviours have been a common theme throughout and they are thought to maintain ED psychopathology, it may be helpful to look at this area in more detail.

Impact of Thought-Shape Fusion on Neutralising/Checking Behaviours

As discussed, neutralising or checking behaviours could maintain cognitive distortions by offering short-term emotional relief, and preventing the discovery that beliefs may not be accurate (Kostopoulou et al., 2011). Body checking has also been found to increase body dissatisfaction, feelings of fatness, and the strength of body related self-critical thinking, which maintain concerns around body shape and image (Shafran, Lee, Payne, & Fairburn, 2007). Following Shafran et al.'s (1999) study, eight studies (of the nine that induced TSF experimentally) investigated whether inducing TSF increases the urge to carry out a neutralising or checking behaviour (Coelho et al., 2008a, 2010, 2012a, 2012b; Jauregui-Lobera et al., 2011a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999), and what effect that has on variables associated with TSF. It is important to note that none of these studies used placebo attention control conditions to rule out spontaneous decline of feelings over time (Shafran et al., 1999), meaning it is unclear whether the findings discussed are solely due to neutralising/checking behaviours carried out. The behaviours carried out by participants in experimental studies included: crossing out/changing the sentence written about the forbidden/fattening food, removing the paper from view, imagining exercising or eating celery, checking body shape/weight in the mirror, and mental ritualisations (Kostopoulou et al., 2011; Radomsky et al. 2002; Shafran et al., 1999).

Findings suggest inducing TSF in those with and without EDs can increase the urge to carry out a neutralising or corrective behaviour (Coelho et al., 2008a; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999), however mixed findings were reported in some of the other studies reviewed. Firstly, Coelho et al. (2012a) carried out a study with participants with EDs (AN or BN), OCD, or no history of

either. Neither those with OCD nor controls chose to neutralise after a TSF or neutral induction condition, whereas significantly more participants with an ED neutralized after the TSF induction compared with a control induction. Therefore, TSF could lead to a greater urge to neutralise, specifically in those with EDs rather than anxiety in general. However, Coelho et al. (2012b) recruited 60 female participants who were of normal weight[22] or overweight[23]. Interestingly, they found no significant differences in neutralization behaviour between those randomly allocated to a TSF induction or control induction. This may support the idea that those who are overweight are less susceptible to TSF. Coelho et al. (2012b) also discussed how those of normal weight might react differently to food cues than overweight individuals, as previously those of normal weight reported less desire for high caloric foods after exposure to tempting food words, whereas overweight individuals described an increased desire of foods (Ouwehand & Papies, 2010). Furthermore, after exposure to food cues, overweight individuals tended to de-activate diet-related goals, whereas it triggered self-regulation in normal weight individuals (Coelho et al., 2012b). Coelho et al. (2012c) also suggested the thought of gaining significant amounts of weight may be less threatening to those who are already overweight, compared with those of normal weight. Therefore, those who are overweight may react differently to food-related thoughts, which could result in less desire to carry out neutralising or checking behaviours. Importantly, this highlights differences between those who are overweight and normal weight, which are not accounted for in the transdiagnostic theory of EDs.

Additionally, Radomsky et al. (2002) specifically looked at differences between females with AN who neutralised after a TSF induction compared with those who did

[22] BMI between 18.5 and 24.9
[23] BMI above or equal to 25

not. Those who neutralized reported significant reductions in anxiety, guilt, likelihood of weight gain, feelings of fatness, and urges to neutralise, but no significant changes in feelings of moral wrongdoing (Radomsky et al., 2002). There were similar findings for those who chose not to neutralise, but unfortunately the sample size was too small to analyse fully (Radomsky et al., 2002). Kostopoulou et al. (2011) also found similar changes post-neutralization in participants with BN. After a TSF induction, all participants used a corrective action to counteract the sentence they had written about a forbidden food. After neutralization, they reported a significant reduction in belief they had gained weight or their body shape had changed, feelings of fatness, anxiety, guilt, and body dissatisfaction (Kostopoulou et al., 2011). Kostopoulou et al. (2011) also found no significant changes in feelings of moral wrongdoing. Radomsky et al. (2002) suggested this might be explained by the nature of the feelings, as anxiety and guilt about past events can change with future events, whereas feelings of moral wrongdoing are unlikely to change with a single event. Moreover, the findings may be a result of how the question was asked, "How morally wrong was it to think about eating the food/write out the sentence?" (Radomsky et al., 2002, p.1171), which appears to be leading.

Although these studies highlight a relationship between TSF and neutralising behaviours, it remains unclear whether there is also a relationship between TSF and eating behaviours. Therefore, Coelho et al. (2008a), Jauregui-Lobera et al. (2011a), and Coelho et al. (2010), investigated what portion size of cake those with or without EDs would choose after a TSF induction, or what reward they would select from a chocolate bar, apple, or money (one Euro)[24] post TSF induction. Coelho et al. (2008a) and

[24] To select portion size, participants were shown a picture/image of a cake and were asked to show the examiner what portion size they would have liked after the induction

Jauregui-Lobera et al. (2011a) found participants with EDs chose smaller cake sizes compared to non-clinical participants, but neither found a significant effect of induction (TSF, anxiety or control) on portion size selected. However, Jauregui-Lobera et al. (2011a) found a significant interaction between induction condition and participant group; participants with an ED selected the smallest portion size under the TSF condition. Therefore, TSF may have an impact on eating behaviour specifically in those with an ED. Moreover, Coelho et al. (2010) found no significant effects of induction condition on choice of reward, but most opted for money rather than food. This might have led to a floor effect, so in a second study they decided to force a choice between an apple or chocolate bar (Coelho et al., 2010). They also looked at the effect of mood on choice of gift and found there was only a significant effect of induction condition on choice of gift for those high in negative affect, but not for those reporting low or medium negative affect (Coelho et al., 2010). Interestingly, those high in negative affect in the control condition were significantly more likely to choose the chocolate bar than those in the TSF induction. This may imply the TSF induction led to a healthier choice of snack for those with low mood, which again highlights that low mood might play a role in TSF. Moreover, the choice of money in the first study may not have been a floor effect, but a desire to choose a non food-related item as a result of TSF.

Therefore, TSF appears to increase the urge to neutralise, particularly in those with EDs. Most participants chose to carry out a mental ritualization or checking behaviour, possibly to alleviate anxiety, guilt, feelings of fatness, or perceived likelihood of weight gain. Furthermore, with regard to eating behaviours, TSF may lead individuals with EDs to select a smaller food portion size (Jauregui-Lobera et al., 2011a), or to select a healthier choice of food (Coelho et al., 2010). All of the results discussed should be interpreted with caution due to a heavy bias towards female, adult participants. Also,

sample sizes have been small throughout and lack of power and small effect sizes may result in some non-significant findings being presented where differences may exist. Although research so far suggests TSF may have a role to play in ED psychopathology, as TAF appears to be relevant to anxiety disorders other than OCD as well, it is also important to see if the effects of TSF are specific to EDs or also occur in other disorders, as this could imply TSF is not any different from TAF.

Specificity of Thought-Shape Fusion to Eating Disorders

As the mentioned in the introduction, it has been argued that TAF may not be specific to OCD but may be associated with anxiety in general (Coelho et al., 2012a), thus it is possible that TSF is also associated with more general psychopathology. This is important to explore when considering the role TSF may play in ED psychopathology and whether EDs and OCD should be considered under the same diagnostic umbrella or not. Research has shown TAF and TSF to correlate highly (Coelho et al., 2008a; Jauregui-Lobera et al., 2012b; Radomsky et al., 2002; Shafran et al., 1999), but unfortunately only one of the articles reviewed investigated the specificity of TSF to EDs (Coelho et al., 2012a), thus highlighting further research is needed.

Coelho et al. (2012a) carried out a study on three groups of women (33 women with an ED, 24 women with OCD, and 26 women in a control group without any history of an eating disorder or OCD). Participants were randomly assigned to a TSF or neutral condition. Those with EDs showed higher susceptibility to the TSF condition than those with OCD or the control group, and showed higher distress after being exposed to the TSF condition than the other groups (Coelho et al., 2012a). Those with EDs also carried out more neutralising behaviours and reported higher concerns about failure to control their thoughts (Coelho et al., 2012a). Interestingly, those with OCD were least susceptible to the TSF condition compared with those with EDs or controls (Coelho et al., 2012a). Therefore, Coelho et al. (2012a) argue that TSF is specific to EDs, though further evidence is needed to support this. This supports Shafran et al. (1999), who concluded that TSF and TAF are similar but separable, and Radomsky et al. (2002) who suggested rather than EDs and OCD sharing aetiology, both have a tendency to fuse “bad

thoughts" and "bad outcomes" but the nature of the thoughts is specific to individuals' concerns.

Clinical Implications

Overal, research has shown TSF could play an important role in the development and/or maintenance of ED psychopathology, however this review has highlighted one key question that remains unanswered: are new interventions needed to address TSF or will it reduce with current cognitive-behavioural treatments (Coelho, 2012)? Shafran and Robinson (2004) suggest TSF may be a direct expression of over-evaluation of eating, weight, and shape, so treatments addressing this should reduce TSF. However, it may be that TSF further contributes to maintenance of the disorder, thus requiring more specific treatment; for example, if someone feels fatter as a result of thinking about food, they are more likely to evaluate themselves on their shape and/or weight (Shafran & Robinson, 2004). This may result in low mood, repeated shape checking, self-criticism (Shafran & Robinson, 2004), and perhaps an attempt to lose weight to boost self-esteem (Fairburn et al., 2003).

Shafran and Robinson (2004) suggest one way to address this would be to adapt current cognitive strategies to demonstrate that thoughts and feelings do not always reflect reality. Radomsky et al. (2002) also suggests encouraging patients to think of a 'fattening' food without engaging in neutralising behaviour, or comparing feelings of fatness with actual changes in weight or shape could be beneficial. Assessing susceptibility to cognitive distortions could aid this and allow therapists to tailor treatments to clients' needs (Coelho, 2012). However, it is important for therapists to consider that TSF and symptoms of depression may be associated (e.g. Coelho et al., 2010), thus TSF may increase patients' distress or greater distress may leave people more vulnerable to experiencing TSF; consequently, it is important to assess and manage risk. Moreover, as negative affect may increase susceptibility to cognitive

distortions (Coelho et al., 2010), treatments aimed at improving mood may also reduce susceptibility to TSF.

As well as providing an overview of clinical implications highlighted in previous research, this review uncovered inconsistent findings regarding whether TSF increases perceived likelihood of weight gain. If it does, it may be that addressing TSF could reduce concerns about perceived likelihood of weight gain, which may in turn reduce avoidance and compensatory behaviours clients often engage in due to the belief they protect them from gaining weight (Fairburn et al., 2003). However, if TSF does not directly impact on perceived likelihood of weight gain, but does impact on feelings of fatness and moral-wrong doing (as research appears to suggest), it may be that these factors are more symbolic of emotion regulation difficulties, particularly as Fairburn (2008) suggests underlying negative emotions can often be mislabeled as 'feeling' fat. This may mean that TSF could reduce as a result of integrating emotion coping skills into therapy (following CBT for Eating Disorders treatment approach; Fairburn et al., 2003). However, this warrants further exploration possibly through research comparing the effects of different treatment approaches on TSF and disordered eating cognitions and behaviours.

Furthermore, whilst feelings of guilt may maintain ED psychopathology (Fairburn et al., 2003), it seems there has been little research investigating addressing this emotion specifically in EDs. As this review highlighted that increases in TSF may lead to increases in feelings of moral-wrongdoing and guilt, it may be that emotion coping skills could again be beneficial, but with more of a focus on guilt. However, addressing TSF may also reduce these feelings without the need for a specific intervention.

Finally, the notion that TSF increases urges to carry out a neutralizing or checking behaviour, perhaps adds further weight to the similarities between TSF and OCD. Clinically, although mirror checking and weight and shape monitoring behaviours are often discussed in therapy (Waller et al., 2007), it could also be worth exploring whether clients carry out any mental ritualisations as well, as these could also prevent disconfirmation of beliefs and add emphasis to their importance (Kostopoulou et al., 2011).

Although this provides avenues to explore, the clinical relevance of findings is yet to be established. It is also important to note that not everyone with EDs will experience TSF (Shafran et al., 1999). This highlights the importance of collaboratively considering cognitive, behavioural, and emotional factors relevant to the individual patient (Waller et al., 2007). Also, developing new treatment approaches to address TSF may be no more effective than current cognitive approaches. Therefore, it is important to investigate clinical implications of these findings to ensure future research and treatments are effective.

Conclusion

Overall, this review has highlighted that TSF appears to be associated with ED psychopathology and manipulating the construct does lead to increased feelings of fatness, moral wrongdoing, anxiety, guilt, and urges to neutralise. This suggests that TSF may have an impact on cognitive factors, emotional factors, and possibly unhelpful behavioural responses, which have been shown to maintain ED psychopathology. The review has developed current knowledge, by highlighting the uncertainty as to whether perceived likelihood of weight gain significantly increases as a result of TSF, as evidence seems to be less clear. This may be due to methodological issues or TSF may not always influence this factor. This needs further exploration as the outcome could have varied implications for treatment of TSF (such as a focus on emotion-coping or cognitive-behavioural techniques). Furthermore, the review has also highlighted the importance of considering guilt and feelings of moral wrongdoing in treatment of EDs; although it was already predicted these would increase following increases in TSF, it perhaps was less clear that feelings of moral wrong-doing appear more specific and relevant to clinical EDs than some of the other factors explored. Thus, this area may also benefit from further research into their role in ED psychopathology and how they might be addressed in treatment.

Research has also shown that AN, BN, and EDNOS have mostly been researched together meaning differences between them with regard to TSF remain unclear. However there appear to be some differences between those who are normal weight/underweight and those who are overweight; those who are overweight may be less susceptible to TSF or respond to food cues differently. Although research has begun to understand the role of TSF in EDs, there are many factors that have not yet been

investigated, such as low self-esteem and thought control strategies (such as thought suppression). Furthermore, in terms of the final criterion to consider when determining if a cognitive distortion plays a role in a disorder ("a reduction or elimination of the distortion is followed by a reduction or elimination of the abnormal behaviour or experience"; Shafran et al., 1999, p168), no studies have yet looked at whether treating TSF would reduce the effects discussed, thus it is unclear whether TSF would need to be addressed in treatment (Coelho, 2012). Nonetheless, the findings overall suggest TSF is a real construct, it does have a significant role to play, and it appears to be specific to EDs, rather than anxiety in general (Coelho et al., 2012a).

Finally, in terms of whether the transdiagnostic theory may help to understand the role of TSF in EDs, the theory explains how cognitive distortions in general play an important role and Shafran and Robinson (2004) suggest TSF may be a direct expression of over-evaluation of eating, weight, and shape, which is central to ED psychopathology (Fairburn et al., 2003). The theory also explains how TSF may lead to compensatory behaviours, particularly as a result of increased concerns around shape and weight, however it is less clear in explaining how feelings of moral unacceptability might contribute to ED psychopathology and how this might be addressed in treatment. Furthermore, even though Fairburn (2008) described all EDs as cognitive disorders, the transdiagnostic model does not highlight any thought control strategies (McDermott & Rushford, 2011; Oliver & Huon, 2001; Soetens, Braet, & Moens, 2008). Nonetheless, the theory appears to account for more cognitive and behavioural components involved in EDs than previous models have, though it seems treatments are still not wholly effective; therefore, perhaps further factors exist that are not accounted for yet (Fairburn et al., 2003), one of which could be TSF.

Future research

Other than the gaps highlighted throughout, many of the measures used in this research have required translation (Coelho et al., 2010, 2012a; Jauregui-Lobera et al., 2011b) and thus, need validation. Furthermore, many of the studies were carried out with female participants (e.g. Coelho et al., 2010, 2012a; Shafran & Robinson, 2004), meaning further research into the experience of TSF in males would be useful. As it has been suggested that obesity might be included in DSM-V (e.g. Volkow & O'Brien, 2007) and there may be some important differences to consider in susceptibility to TSF between those who are overweight and of normal weight, it is important to continue researching this area (Coelho et al., 2012c). Finally, further research is also needed to look at other factors that may play a role in the relationship between TSF and unhelpful behaviours in those with EDs, such as thought suppression, depressive symptoms, and low self-esteem.

UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

School of Psychology

Thought-Shape Fusion, Thought Suppression, and Disordered Eating Behaviours in a University Sample.

Empirical Research Study

by

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Introduction

Disordered eating refers to problematic eating behaviours, such as restricted eating, binge-eating, purging, and deviations from normal Body Mass Index[25] (BMI), which are less severe or occur less frequently than in those who meet full criteria for an eating disorder (ED; Gan, Mohd Nasir, Zalilah, & Hazizi, 2011). The term 'eating disorder' (ED) covers an array of psychiatric diagnostic categories, including anorexia nervosa (AN), bulimia nervosa (BN), and eating disorders not otherwise specified (EDNOS[26]). As the DSM-IV-TR diagnostic criteria show (APA, 2000; Appendix C), dietary restraint (the intention to restrict food intake to control one's body weight; Williamson et al., 2007), binge-eating (episodes of eating an objectively large amount of food given the circumstances, with a sense of loss of control[27]; Fairburn, 2008), and compensatory behaviours, such as purging or excessive exercise, are key behaviours to consider in determining whether someone meets criteria for an ED, alongside other cognitive and physiological factors. Evidence suggests individuals are likely to migrate between EDs over time, which has led researchers to suggest a focus on a transdiagnostic rather than disorder-specific approach to treatment (e.g. Fairburn, Cooper, & Shafran, 2003); currently, Cognitive-Behaviour Therapy (CBT) holds the largest evidence base for all the EDs in adults (National Collaborating Centre for Mental Health (NCCMH), 2004).

Disordered eating patterns have been found to predict problematic outcomes, such as weight gain and EDs for adolescents and young adults (e.g. Field et al., 2003,

[25] Deviations from BMI may occur as a result of unhelpful behaviours used to control one's weight and shape (Kavazidou et al., 2012).

[26] As some concepts have already been defined in the literature review, please see page 15 for a list of definition of terms.

[27] It is also possible for individuals to experience subjective binge-eating, whereby the amount of food would be considered normal or small given the circumstances but the individual experiences a sense of loss of control still and considers the portion to be too large (Fairburn, 2008).

2007; Heatherton, Mahamedi, Striepe, Field, & Keel, 1997; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). Full-syndrome EDs demonstrate a high risk of mortality compared with other psychiatric disorders[28] (Royal College of Psychiatrists (RCP), 2012). Despite ample research into the aetiological and maintaining factors in EDs, current psychological treatment outcomes for those with BN is fairly poor (with around 50% not responding adequately; NCCMH, 2004), as is treatment acceptance and compliance for those with AN (e.g. Halmi et al., 2005). Furthermore, as prevalence rates for clinically severe eating disorders are thought to lie between 1% and 1.5% in young women (RCP, 2000)[29], there is a need for further research and treatment developments. Although dieting behaviours and EDs appear to be more common amongst children and adolescents (Merikangas et al., 2010), a longitudinal study found the prevalence and course of dieting, unhealthy and extreme weight control behaviours, and binge-eating behaviours either remained high or increased from adolescence to young adulthood (Neumark-Sztainer et al., 2011). The National Institute of Clinical Excellence[30] (NICE; 2004) recommends individuals with EDs receive treatment at the earliest possible stage to reduce severity of the condition, meaning understanding and addressing disordered eating behaviours in young adults could be of benefit.

Comorbidity and lack of understanding of how to address this in treatment (NCCMH, 2004) may explain some of the poorer treatment outcomes seen in BN and the increased interest in researching commonality between Obsessive-Compulsive Disorder (OCD) and EDs (Roncero, Perpina, & Garcia-Soreano, 2011), particularly due to their high comorbidity (e.g. Altman & Shankman, 2009). Roncero et al. (2011) suggest some

[28] The standardized mortality ratio has been estimated at 538 (compared with 136 to 197 for depression, schizophrenia, and alcoholism; RCP, 2000)

[29] Men can be affected by eating disorders, however the conditions are much more common amongst women (RCP, 2000).

[30] Now referred to as the National Institute for Health and Clinical Excellence.

explanation for the overlap stems from common personality and biological features, however from a psychopathological stance Shafran (2002) proposed understanding beliefs may provide a link; the Obsessive Compulsive Cognitions Working Group (OCCWG, 1997, 2001, 2003) proposed six belief domains that contribute to the aetiology and/or maintenance of OCD, some of which some could be relevant to understanding EDs (Roncero et al., 2011). These include: inflated responsibility, over-importance of thoughts (including thought-action fusion (TAF)), importance of controlling thoughts, overestimation of threat, intolerance of uncertainty, and perfectionism. Of these, controlling one's thoughts and TAF in EDs have attracted more recent interest (Roncero et al., 2011), partly due to the lack of understanding of the role thought suppression plays in EDs. TAF was also found to be relevant to other anxiety disorders as well (e.g. Dastgiri, Nateghian, & Goodarzi, 2010). leading Shafran, Teachman, Kerry, and Rachman (1999) to hypothesise that a similar concept may exist in EDs (thought-shape fusion; TSF)

Thought-Shape Fusion

TSF is based on theory of OCD, in particular TAF. Therefore, understanding how TAF relates to OCD psychopathology may aid understanding of TSF as a concept and how it relates to ED psychopathology. TAF refers to the belief that having an intrusive thought can directly influence the external event related to that thought (likelihood TAF[31]) and/or having the thought is morally equivalent to carrying out the event (moral TAF[32]; Shafran & Rachman, 2004; Shafran & Robinson, 2004). Therefore, TAF encompasses an

[31] Likelihood TAF has also been referred to as probability bias (Rassin, Muris, Schmidt, & Merckelbach, 2000).
[32] Moral TAF has also been referred to as morality bias (Rassin et al., 2000).

interpretation bias for threat (Frost & Steketee, 2002). Frost and Steketee (2002) argued these beliefs could lead to engagement in rituals to prevent the feared outcome, thus explaining the aetiology and maintenance cycle of OCD. Furthermore, feelings of moral wrongdoing could increase distress due to a sense of over-inflated responsibility (Frost & Steketee, 2002).

Due to similarities between OCD and EDs and as TAF has been found to be relevant to other anxiety disorders as well, (e.g. Abramowitz, Whiteside, Lynam, & Kalsy, 2003), Shafran et al. (1999) proposed TSF may also consist of factors paralleling those in TAF: likelihood TSF (the belief that thinking about eating a forbidden food will increase the likelihood of gaining weight or changing shape) and moral TSF (thinking about eating a forbidden food is morally equivalent to eating it). However, due to differences between the conditions as well, it was hypothesised these factors would reflect concerns more indicative of difficulties specifically experienced by those with EDs. Shafran et al. (1999) also proposed TSF may consist of an additional factor more specific to ED psychopathology, which is feeling TSF (thinking about eating a forbidden food increases feelings of fatness; Shafran & Robinson, 2004). Although TSF may consist of different constructs, research has not supported this classification; therefore, Shafran et al. (1999) recommended TSF be measured as a single factor. Studies have shown TSF to be associated with ED symptoms in patients and non-clinical samples (e.g. Coelho, Carter, McFarlane, & Polivy, 2008; Radomsky, De Silva, Todd, Treasure, & Murphy, 2002). The transdiagnostic theory of EDs (Fairburn et al., 2003) may explain this association, in that the over-evaluation of eating, shape, weight, and/or control is core in maintaining all EDs. Thus, an increased estimate of shape, weight, or increased feelings of fatness (from TSF) could trigger dieting, bingeing, and compensatory behaviours to avoid weight gain. Research is still in the early stages of establishing what

effect, if any TSF has on ED psychopathology, however evidence suggests it is positively and significantly associated with cognitive and behavioural ED symptoms (e.g. Coelho et al., 2008a; Kostopoulou Varsou, & Stalikas, 2011; Shafran & Robinson, 2004). Although research has investigated whether TSF is associated with global ED psychopathology and cognitions, it has yet to fully examine the relationship between TSF and disordered eating or compensatory behaviours. Some researchers have investigated whether experimentally inducing TSF in participants increases the urge to carry out neutralising/checking behaviours (such as crossing out sentences written about food to undo any negative consequences they believe may occur as a result or checking one's body shape in the mirror after thinking about food, to ensure no changes have occurred), many of whom found it did (e.g. Coelho et al., 2008a; Radomsky et al., 2002). However, further research is needed to look at the effects of TSF on other disordered eating behaviours, such as binge-eating and compensatory behaviours. Although research has shown that TSF plays a role in ED psychopathology, the role of thought suppression in ED psychopathology is less clear.

Thought Suppression

As mentioned, another OCD belief domain attracting attention in EDs is importance of controlling one's thoughts (OCCWG, 1997, 2001, 2003; Roncero et al., 2011). Some studies have shown a tendency for patients with EDs and those who diet to use thought control strategies, such as thought suppression (e.g. Harnden, McNally & Jimerson, 1997; O'Connell, Larkin, Mizes & Fremouw, 2005). To explain thought suppression theoretically, Wegner (1994) proposed Ironic Processes Theory. This stipulates that core to determining whether an individual is able to 'control' their mind is whether or

not they have the mental capacity to do so; when capacity is reduced (for example, through stress), the individual is unable to exert control and the process leads to the opposite of what the individual was trying to do (ironic effects; Wegner, 1994). This occurs due to two underlying processes working towards the desired mental state: an intentional operating process (IOP) and ironic monitoring process (IMP; Wegner, 1994). The IOP searches for features congruent with the desired mental state, whereas the IMP searches for information confirming the desired state has not been met. The IOP requires more effort than the IMP, thus when mental capacity is under stress, the IOP becomes limited and the IMP takes over; the search for mental control failings may enter into consciousness, resulting in feelings of failure at mental control (Wegner, 1994).

Therefore, this theory suggests trying not to think of a thought triggers a monitoring process that searches for the thought, which when it enters into consciousness, undermines the very nature of thought suppression (Wegner, 1994). Furthermore, two differing searches are believed to occur within this process, a feature-positive search and feature-negative search. For example, during concentration, a feature-positive search looks for a particular item, whilst the IMP conducts a feature-negative search (looking for evidence that does not fit with the item; Wegner, 1994). During thought suppression, the individual engages in a feature-negative search and the IMP searches for the thought, meaning it is engaging in a feature-positive search. Feature-positive strategies are easier to engage in than feature-negative strategies (Wegner, 1994). This explains thought suppression in OCD, as it involves active resistance of unwanted thoughts (Najmi et al., 2010), which can lead to a paradoxical increase in their frequency, resulting in more discomfort and increased perceived intensity of the intrusions (also known as the 'white bear effect'; Rachman, 1998;

Rassin, Muris, Schmidt, & Merckelbach, 2000, p.891). Exacerbation of intrusions may also result in increased obsessions (regarding trying to push thoughts away) and compulsive behaviours (Rassin et al., 2000). Currently, findings are inconsistent regarding the role of thought suppression in OCD (Altin & Gencoz, 2011), however Purdon and Clark (2002) suggested the re-occurrence of thoughts during suppression strengthens the negative appraisal of the its meaning. Therefore, if thought suppression also plays a role in EDs, it may strengthen the over-evaluation of the importance of eating, weight, and shape, which may result in more disordered eating behaviours (Fairburn et al., 2003). Some research has explored the role of thought suppression in EDs, with mixed findings.

Research Investigating Thought Suppression in Eating Disorders

As mentioned, the relationship between thought suppression and ED psychopathology is somewhat unclear; whilst some research shows thought suppression may be linked to unhelpful cognitions and behaviours relating to disordered eating (e.g. O'Connell et al., 2005; Soetens Braet, Dejonckheere, & Roets., 2006; Soetens, Braet, & Moens, 2008), others suggest the relationship may not exist (Harnden et al., 1997; Oliver & Huon, 2001). Those with BN and who diet are thought to be preoccupied with food, eating, body weight and shape (Harnden et al., 1997) and those who diet are thought to rely on cognitive controls rather than physiological cues to regulate their eating. Based on Wegner's (1994) Ironic Processes Theory, Harnden et al. (1997) suggested those who diet try to avoid thoughts about eating which results in their paradoxical increase and preoccupation with them. Together with reliance on thought control to regulate eating, this may explain why binge-eating patterns are often observed in those who diet.

Furthermore, O'Connell et al. (2005) suggested food-related thoughts lead to more hunger, leaving the individual more vulnerable to non-adherence to a restricted diet. Therefore, it seems thought suppression may play a role in both restricted and binge-eating behaviours.

In support of a link between thought suppression and dieting behaviours, a study by Barnes and Tantleff-Dunn (2010) found those who reported current dieting carried out higher levels of food thought suppression than those who did not. However, the analyses were cross-sectional and correlational so it is important to note that causal relationships have not been proven. Furthermore, O'Connell et al. (2005) investigated the impact of dietary restraint and caloric preload on thought suppression in restrained and unrestrained eaters (as it has previously been argued that differences in thought suppression between restrained and unrestrained eaters may only emerge under actual or perceived caloric preload; e.g. Spencer & Fremouw, 1979). The results also showed restrained eaters who suppressed food related thoughts demonstrated significantly more food and eating related thoughts than unrestrained eaters in the same condition, suggesting restrained eaters were perhaps less able to suppress the thoughts. However, despite preloading being associated with increased frequency of indirect verbal expression of food and eating, O'Connell et al. (2005) suggested there was no evidence of a rebound effect in any of the conditions. It is unclear how this was concluded, as the authors suggested a rebound effect encompasses "an increase in the frequency and intensity of a targeted thought after a suppression period" (p.42), which their study appeared to show.

Whilst this study is less clear in its findings, it is possible they show thought suppression initially increases thoughts about food, eating, shape, and weight, but may not impact on later preoccupation with such thoughts. This is supported by Harnden et

al. (1997) who investigated thought suppression in those who dieted and did not diet (neither group had any history of EDs). Interestingly, non-dieters experienced a greater rebound effect after a thought suppression task compared to a control group, whereas no rebound effect occurred for dieters (Harnden et al., 1997). Nonetheless, those who dieted did report weight-related thoughts more frequently than those who did not diet, despite not experiencing a rebound effect, which implies that thought suppression may not maintain preoccupation with the thoughts (Harnden et al., 1997). However, it is also possible that those who dieted continually engaged in thought suppression, which may dampen the effects of a brief thought suppression task (Harnden et al., 1997).

Unfortunately, other than these studies not much research has looked at the effect of thought suppression on restricted eating behaviours, however more research seems has focused on thought suppression and binge-eating behaviours. Johnston, Bulik, and Anstiss (1997) proposed that if the paradoxical increase in unwanted thoughts following thought suppression translates into behaviour, then trying not to think about or eat foods may result in more consumption of that food, which could explain binge-eating behaviours rather than dieting behaviours. Furthermore, it has been suggested that thought suppression may also be related to negative affect, which is thought to play an important role in EDs, primarily through the use of binge-eating and compensatory behaviours to avoid unpleasant affective states (Lavender, Jardin, and Anderson, 2009). In support of this, a study by Lavender, Anderson, and Gratz (2012) found that thought suppression was associated with ED symptoms and mediated the effects of negative affect on ED symptoms in a sample of men. Whilst thought suppression and negative affect were significantly associated with the restraint subscale of the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994), they were more relevant to shape, weight, and eating concerns than restricted eating

behaviours, suggesting that thought suppression might relate more to avoiding negative affect as a result of these concerns rather than the rebound effect as mentioned earlier. However, it is important to note that Lavender et al.'s (2012) research was carried out with men, meaning the findings may not generalize to females with whom EDs are much more common.

Other studies have also found that thought suppression is associated with binge-eating behaviours (e.g. Barnes, Masheb & Grilo, 2011; Barnes & Tantleff-Dunn, 2010; Soetens et al., 2008), however many have used questionnaires rather than experimentally manipulating thought suppression and observing behaviours. One study that did experimentally investigate this further was that by Johnston et al. (1997), who studied whether suppression of chocolate-related thoughts led to improved performance on a task yielding chocolate rewards (this has been shown to be a good predictor of chocolate-related behaviour; Johnston et al., 1997). Those who suppressed thoughts gained more chocolate than those in the control group, regardless of whether they were chocolate cravers or not. Therefore, thought suppression may lead to more binge-eating behaviours, However, the authors did not observe whether participants *consumed* the chocolate they won; it would be interesting to see if there would be a similar outcome for non food-related rewards to ensure findings represented binge-eating behaviours rather than positive affect as a result of achievement.

Whilst these findings suggest thoughts suppression may be associated with binge-eating behaviours, others have shown the opposite, adding to controversy as to whether thought suppression does impact on disordered eating behaviours. Unlike Johnston et al. (1997), Mann and Ward (2001) studied actual consumption of food after a thought suppression task and attempts to restrict food intake. The findings showed that participants who were instructed not to or chose not to eat a food, initially ate less

of it and did not later experience a rebound eating effect compared to a control group. Interestingly, thoughts of food decreased in a control group after some time, whereas those who were trying not to think about the food later experienced a rebound effect, however this did not appear to translate into behaviour. Therefore, It is possible that the rebound effect may have taken longer to occur than had been measured in previous studies but it still may have little effect on binge-eating behaviours. However, it is also possible that those who diet are able to achieve restraint for a while, though they may succumb to the urge to eat later on, thus it could be important for studies to look at longer-term effects of thought suppression on behaviours.

Finally, further supporting the idea that thought suppression may not play a role in binge eating behaviours is a study by Oliver and Huon (2001), who investigated thought suppression in high dishinbitors (those who show a tendency to overeat) and low disinhibtors. They found that low disinhibitors who were instructed to suppress their thoughts had more food-related thoughts than high disinhibitors. High disinhibitors also reported less difficulty controlling their thoughts. Thus, those who have a tendency to overeat appeared to be more successful at thought suppression at least in the short term. However, based on Wegner's (1994) theory, it could be that participants were engaging in feature-positive searches as they were asked to press a button each time a word came to mind to determine whether they were able to suppress thoughts, which are thought to be easier to carry out than feature-negative searches. Therefore, it is important to consider methodology used in thought suppression research. Overall, research appears to be inconsistent regarding whether thought suppression impacts upon disordered eating behaviours, but due to methodological issues, it appears evidence showing thought suppression does *not* play a role in binge eating behaviours may not be that reliable and could have measured

rebound effects prematurely. Thus, thought suppression could play a greater role in binge-eating behaviours than eating restraint.

Association Between Thought-Action Fusion, Thought Suppression, and OCD Behaviours

Although evidence so far does not wholly support the relationship between thought suppression and disordered eating behaviours, some have suggested there may be a link between TSF and thought suppression (Coelho et al., 2008a). This may be due to research showing a relationship between TAF and thought suppression, which impacts upon obsessive-compulsive symptoms (Rachman, 1998) and the suggested overlap between EDs and OCD. In previous TSF research, Coelho et al. (2008a) found unrestrained eaters (but not restrained eaters) showed significantly higher perceived likelihood of weight gain (a key factor in TSF; Shafran et al., 1999) after a TSF induction compared to a control group, which they suggested may be due to restrained eaters using thought control strategies to avoid engaging in the induction (Coelho et al., 2008a). Therefore, it may be helpful to look at previous research investigating the link between TAF, thought suppression, and OCD behaviours to hypothesise how TSF might relate to thought suppression and the impact this may have on disordered eating behaviours.

Rachman (1998) suggested an association between TAF and thought suppression, could maintain OCD symptoms through a vicious cycle. For example, clients may believe suppressing the thought reduces the likelihood of that event occurring, which may increase thought suppression in the future due to an inflated sense of importance of the thought and heightened sense of responsibility to prevent

the negative event occurring. Also, the paradoxical increase in frequency of the thought may be misinterpreted as a sign of the thought's significance, thus strengthening its catastrophic misinterpretation (Rassin et al., 2000) and leading to engagement in behaviours to prevent the feared event occurring. To investigate this further, Rassin et al. (2000) looked at five models of interactions between TAF, thought suppression, and OCD symptoms. The model that best explained the data showed that TAF and thought suppression interacted and resulted in greater obsessive-compulsive symptoms (Rassin et al., 2000). Furthermore, the results suggested that TAF had a more influential role than thought suppression in obsessive-compulsive symptoms, as suppression may play more of an intermediate than causal role in the relationship (Rassin et al., 2000).

Nonetheless, the findings supported a relationship between TAF, thought suppression and OCD symptoms. In terms of clinical implications, these findings addressing TAF in treatment could reduce the urge to suppress thoughts, however addressing thought suppression alone is likely to leave TAF still requiring treatment (Rassin et al., 2000). However, it is also possible that without addressing thought suppression, the individual may continue to draw on this as a maladaptive coping strategy in the future should they relapse. As with all of the studies reported these findings should be interpreted with caution, as the study was carried out with a non-clinical sample, meaning they may not generalise to a clinical population. Thus, if OCD and EDs overlap in terms of psychopathology, it is feasible that TSF may interact with thought suppression, which could increase disordered eating behaviours.

Overall, studies have demonstrated that TSF may play a distinct role in disordered eating behaviours, however findings are perhaps less clear with regard to the role of thought suppression. Evidence also has shown TAF and thought suppression are together, influential in obsessive-compulsive symptoms (Rassin et al., 2000).

Therefore, to investigate the overlap between OCD and EDs further and to clarify the role thought suppression plays in ED psychopathology, it may be helpful for research to explore the relationship between TSF and thought suppression, and their influence on disordered eating behaviours.

Aim

The aim of this study was to investigate whether disordered eating behaviours are related to self-reported levels of TSF and thought suppression.

Hypotheses

- There will be a significant interaction effect of TSF and thought suppression on binge-eating behaviours and compensatory behaviours but not restrained eating behaviours. Specifically, those who report high thought suppression and high TSF will carry out more disordered eating behaviours than those who report high thought suppression and low TSF, high TSF and low thought suppression, and low TSF and low thought suppression.
- There will be a significant main effect of TSF on all disordered eating behaviours and a significant main effect of thought suppression on binge-eating and compensatory behaviours, but not restrained eating behaviours.

Method

Ethical approval was fully granted by the University of Southampton (Appendix D). The design was an independent factorial design, with independent variables of thought suppression (high or low) and TSF (high or low). Dependent variables included scores on the Eating Disorders Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and the Three Factor Eating Questionnaire Revised (TFEQ-R18; Karlsson, Persson, Sjostrom, & Sullivan, 2000; See Appendix E for a table detailing the questions and subscales used in the analyses). Shafran and Robinson (2004) suggested low mood might influence some questions on the Thought-Shape Fusion Questionnaire (TSFQ; Shafran et al., 1999), therefore depression was measured by the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) with the aim of controlling for it in the analyses. However, this later changed for reasons explained in the data analysis section.

Participants and Recruitment

Participants were recruited via the University of Southampton psychology electronic booking system for experiments, Psychobook, word of mouth, and posters (Appendix F). All participants were female and aged 18 and above. The required sample size was calculated using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009). As Based on an ANCOVA (fixed effects, main effects, and interactions) model, with a medium effect size[33], power (1-β) = 0.90, four groups, and one covariate, the required sample size was

[33] Although no research has investigated TSF and thought suppression in a university sample, previous studies investigating associations between TSF and ED psychopathology have yielded medium to large

338 or 85 people in each group. The study was expected to require access to 450 participants to allow for 25% non-response, which was available from the University of Southampton (undergraduate and postgraduate students). Male participants were excluded because some differences exist between males and females who experience disordered eating patterns (Muise, Stein, & Arbess, 2003), thus findings in a predominantly female sample may not be applicable to males[34]. Participants were also excluded if their scores placed them in more than one group[35] (high or low TSF/thought suppression) or if more than 10% of Data were missing on the TSFQ and White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994; Lynch, 2003). Finally, participants were excluded if they completed the questionnaires in less than six minutes, as this was deemed too fast to be accurate (based on a trial run carried out by the experimenter). Therefore, the total number excluded was 46, leaving the final sample size as 355. It was not possible to calculate a response rate, as the questionnaires were open to anyone who has access to the internet.

Procedure

The study was advertised on Psychobook and I-survey (a survey generation and research tool for distributing online questionnaires) so that students could click a link to participate (https://www.isurvey.soton.ac.uk/5183). Participants were asked to read an information sheet and complete an online consent form before starting the study (Appendix G). Those who consented to take part completed the following

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effect sizes (e.g. Radomsky et al., 2002; Shafran et al., 1999), thus it may be expected this study could achieve similar effect sizes (Field, 2005).

[34] The sample is likely to be predominantly female due to EDs being more common in women (RCP, 2000).

[35] This will be explained further in the data analysis section.

questionnaires online: EDE-Q, TFEQ-R18, TSFQ, WBSI, and HADS[36] (Appendix H). Participants were prompted if they missed a question but were able to continue to the following questionnaire without completing all questions if they chose to. All questionnaires were completed using I-survey. Participants completed demographic information via the EDE-Q (height and weight) and two further questions were added to determine participants' gender and age (see Appendix H). Participants were able to view a debriefing form at the end (Appendix I) and were provided with two research credits for taking part; these were allocated via an automated system on Psychobook to ensure anonymity was met.

Materials and Measures

Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994).

This is a standardised 32-item self-report questionnaire derived from the Eating Disorder Examination interview. Items are scored using a seven-point likert scale, from zero (no days) to six (every day). Twenty-two items (split into four subscales: dietary restraint, eating concerns, concerns about weight, and concerns about shape) measure attitudinal ED pathology. Frequency of ED behaviours (binge-eating and compensatory) is assessed by the number of episodes in the last four weeks. Higher scores reflect greater severity of symptoms. The EDE-Q has demonstrated excellent internal consistency and two-week test-retest reliability for each of the four subscales (Luce & Crowther, 1999). For this sample, Cronbach's alpha was .84 for the restraint subscale and .96 for global EDE-Q score.

[36] The HADS has not been included in the appendices for copyright reasons.

Three Factor Eating Questionnaire Revised-18 (Karlsson et al., 2000).

This is an 18-item self-report measure capturing three factors: restrained eating[37], uncontrolled eating[38], and emotional eating[39] (De Lauzon et al., 2004), derived from the Three Factor Eating Questionnaire (Stunkard & Messick, 1985). Items are scored on a four-point scale (definitely true, mostly true, mostly false, definitely false) with higher scores indicating more of the behaviour. The scale has been shown to have high internal reliability and validity in a university sample (Bardone-Cone & Boyd, 2007). In this sample, Cronbach's alpha was .85 for the uncontrolled eating subscale and .84 for the cognitive restraint and emotional eating subscales.

Thought-Shape Fusion Questionnaire (Shafran et al., 1999).

This is a 34-item self-report measure. The first part contains 17 items covering three domains of TSF (likelihood, moral, and feeling components). The second section contains 17 items measuring interpretation of thinking about 'forbidden' or 'fattening' foods. Participants rate their agreement with each item on a five-point Likert scale from zero (not at all) to four (totally). Mean scores for the two subscales are computed separately. Higher scores indicate greater TSF. There are two additional open-ended items asking about other interpretations, however these are not included in the mean scores (Shafran & Robinson, 2004). As Shafran et al. (1999) recommended TSF is measured as a single factor, a total score was used in the analysis rather than feeling,

[37] Restrained eating refers to conscious restriction of food intake to control body weight or promote weight loss (De Lauzon et al., 2004).
[38] Uncontrolled eating refers to a tendency to eat more than usual due to a loss of control over intake accompanied by subjective feelings of hunger (De Lauzon et al., 2004).
[39] Emotional eating refers to an inability to resist emotional cues (De Lauzon et al., 2004).

moral, and likelihood TSF. TSF concept and interpretation were also not looked at individually in relation to disordered eating outcomes, as differences in these factors were not relevant to the hypotheses; however, means and standard deviations for TSF concept and interpretation are reported to aid understanding of differences in group characteristics. The scales (concept and interpretation) have high internal reliability (*a* = 0.95 and 0.97 respectively; Shafran & Robinson, 2004) and good predictive validity (Shafran et al., 1999). In this sample, Cronbach's alpha was .93 for TSF concept, .95 for TSF interpretation, and .96 for TSF total.

White Bear Suppression Inventory (Wegner & Zanakos, 1994).

This is a 15-item self-report questionnaire, which can be used to identify individuals who are prone to developing chronic thought suppression (Wegner & Zanakos, 1994). Items are scored on a five-point scale from one (strongly disagree) to five (strongly agree), with a higher score indicating a greater tendency to suppress thoughts. The questionnaire has very good internal consistency (alphas ranging from 0.87 to 0.89) and test-retest reliability (a three-week to three-month correlation of 0.69; Wegner & Zanakos, 1994). The measure also has excellent convergent validity (Wegner & Zanakos, 1994). Cronbach's alpha for total WBSI in this sample was .93.

The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983).

This standardised 14-item self-report screening scale was designed to detect possible anxiety and depression in medical outpatient clinics (Zigmond & Snaith, 1983). It contains two seven-item subscales: anxiety and depression. Both subscales have a

maximum score of 21. Recommended clinical cut-off points are: 8-10 (mild), 11-15 (moderate), and 16 and above (severe; Snaith & Zigmond, 1994). Items are scored on a four-point scale, ranging from zero (not at all) to three (very often indeed). The measure has been found to be valid and reliable in medical patients (Herrmann, 1997). The aim of this measure was to detect and control for symptoms of depression. Cronbach's alpha for the depression subscale in this sample was .78.

According to the National Eating Disorder Information Centre (NEDIC, 2012) disordered eating encompasses a wide range of abnormal eating behaviours, for example, restrained eating, binge-eating, and other compensatory behaviours, such as excessive exercise, dieting, and irregular and unhelpful eating patterns. Therefore, the EDEQ and TFEQ were used to measure these behaviours (for further details see Appendix E). In particular, the outcome variables included: items 13-18 on the EDE-Q (frequency of disordered eating behaviours, including excessive exercise, bingeing, and purging behaviours), the restraint subscale of the EDE-Q (a tendency to restrict food intake and to adhere to rigid rules around eating), global EDE-Q score (overall ED psychopathology), cognitive restraint (conscious restriction of food intake), uncontrolled eating (a tendency to lose control over eating, for example when hungry or when exposed to external stimuli), and the emotional eating subscales of the TFEQ (a tendency to overeat in relation to negative mood states). Both the TFEQ and EDEQ were used to measure outcomes rather than a single questionnaire as the TFEQ focuses more on a general tendency to carry out behaviours and the EDE-Q measures frequency of behaviours carried out. The TFEQ also detects uncontrolled eating according to hunger and exposure to external stimuli, which is not accounted for by the EDEQ.

Data Analysis

Data were analysed using the statistics package SPSS Version 20 for Mac. It was intended that symptoms of depression would be controlled for; although Spearman's rho correlation analysis showed a significant relationship between depression and TSF (r = .350, p < .001) and depression with thought suppression (r = .417, p < .001), a Mann Whitney U test showed those who reported high TSF had significantly higher depression scores than those who reported low TSF (U = 21,118.5, p = .000). Similarly, those who reported high thought suppression had significantly higher depression scores than those who reported low thought suppression (U = 21,655.5, p = .000). According to Field (2009), when groups differ on the covariate, it is inappropriate to control for this variable, so depression was not controlled for. Unfortunately, there were no guidelines for missing data in any of the questionnaires used other than the TFEQ and EDE-Q, therefore where less than 10% of Data were missing for the WBSI, TSFQ, and HADS, mean values were substituted (Lynch, 2003); for the TFEQ and EDE-Q it was recommended that a score should still be computed for each subscale if at least half of the items for the subscale were completed (HRQL group, 2000; Fairburn & Beglin, 1994).

The assumptions of parametric tests were explored. Whilst a factorial Multivariate Analysis of Variance (MANOVA) would have reduced the likelihood of Type I error (Field, 2009), Box's M test yielded a value of 713.622 and was associated with a p value of .000, which meant the assumption of homogeneity of variance was violated[40]. Therefore, the dependent variables were analysed using a 2x2 factorial ANOVA (with the two independent variables being TSF and thought suppression, each with two

[40] This meant that variances of data in each group were not equal neither were the correlations between any two variables.

levels: high and low). To ensure participants were independently assigned to different groups (high TSF, low TSF, high thought suppression, and low thought suppression) a median split was carried out on the IVs (TSFQ and WBSI); participants scoring between half of the standard error either side of the median (52 for the WBSI and 11 for the TSFQ) were excluded[41]. Therefore, those who scored between 10.47 and 11.53 on the TSFQ or 51.7 and 52.3 on the WBSI were excluded (N=28). It is common practice to exclude the middle values when dichotomizing data (De Coster, Iselin, & Gallucci, 2009; Feldt, 1961). Data were not normally distributed, which is a violation of one of the assumptions, however factorial ANOVAs are thought to be fairly robust to this (Field, 2009). The Levene's test also revealed that for most outcome variables the assumption of homogeneity of variance was also violated. Transforming data (by log transformation and square-root transformation, as Data were positively skewed) to reduce these effects was explored but made little difference to the distribution of data, so the original data set was used. Therefore, as assumptions for both the MANOVA and ANOVAs were violated, it was decided 2x2 factorial ANOVAs would be used to explore the data due to fewer of the assumptions being violated (see Appendix J and K for decision tree and pros and cons of each choice). Group differences between those who reported high and low TSF and high and low thought suppression were analysed using the Mann Whitney U test. Finally, correlational analyses were carried out to determine whether relationships between TSF, thought suppression, and disordered eating behaviours were significant. As Data were not normally distributed and contained outliers[42], the analysis was conducted using a non-parametric test (Spearman's Rho). Significance

[41] For example, if those scoring above 52 on the WBSI were placed in one group and below 52 in another, then those scoring 52 would be excluded as they would fall into both groups.
[42] Outliers were not removed as there was no valid reason for doing so.

levels were set at an alpha value of .05 and all tests were two-tailed. In total, 11 ANOVAs and 25 correlations were carried out.

Results.

Group Characteristics

Participants' were aged between 18 and 50 years old (M = 20.80, SD = 4.38), with BMIs rangjng from 13.51 to 45.92 (M = 22.09, SD = 3.72). The mean time taken to complete the questionnaires was 15.77 minutes (SD = 10.03). Table 1 shows descriptive statistics (age, BMI, TSF concept, TSF interpretation, TSF total, WBSI total, and depression) for those who experienced high and low TSF and high and low thought suppression. The number of participants who reported high TSF and high thought suppression, high TSF and low thought suppression, low TSF and high thought suppression and low TSF and low thought suppression can be seen in Table 2.

Table 1.

Descriptive Statistics (*Means (M), standard Deviations (SD), and Mann-Whitney U Test Statistics) for Participants High and Low in TSF and High and Low in Thought Suppression (TS).*

	Thought-shape fusion				**Thought Suppression**				***U***	
	High[a] (N=170)		**Low (N=185)**		**High (N=181)**		**Low (N=174)**		**High TSF Vs Low TSF**	**High TS Vs Low TS**
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**		
Age (years)	20.6	4.1	21.0	4.7	20.7	4.2	20.9	4.5	15063.0	14, 898.0
Time taken (mins)	16.8	11.7	15.7	8.2	15.9	8.2	16.6	11.7	15619.0	15473.5
BMI	22.8	3.4	21.4	3.8	22.4	4.1	21.8	3.2	10459.0***	14149.5

TSF concept	15.0	11.1	1.5	1.8	9.6	11.4	6.2	8.7	1554.5***	12687.0**
TSF interpret-ation	20.1	12.7	2.3	2.4	14.2	14.2	7.3	9.7	937.5***	10671.5***
TSF total	35.0	19.9	3.8	3.2	23.8	23.1	13.5	17.1	-	11090.5***
WBSI total	53.5	10.0	46.4	12.5	58.8	4.9	40.4	9.6	10297.5***	-
HADS (Depression)[b]	5.0	3.6	2.9	2.6	4.9	3.5	2.8	2.6	12621.0***	13258.0***

*P<.05, **p<.01, ***p<.001

[a]High thought suppression scores ranged from 53 to 75, low thought suppression scores ranged from 15 to 51, high TSF scores ranged from 12 to 104, and low TSF scores ranged from 0 to 10.

[b]Clinical cut off scores: 0-7 (non-clinical), 8-10 (mild), 11-15 (moderate), 16 and above (severe; Snaith & Zigmond, 1994).

Table 2.

Number of Participants who Reported High TSF and High Thought Suppression, High TSF and Low Thought Suppression, Low TSF and High Thought Suppression, and Low TSF and Low Thought Suppression.

	Thought Shape Fusion	
Thought Suppression	High	Low
High	107	74
Low	63	111

There were no significant differences between the groups (high and low TSF or high and low thought suppression) in terms of age or time taken to complete the questionnaires. Although there were no significant differences in BMI between those who reported high and low thought suppression (U = 14149.50, Z = -.87, p = ns, r =-.05), those who reported high TSF had significantly higher BMIs than those who reported low TSF (U = 10459.00, Z = -4.81, p < .001, r =-.26). The high TSF group also reported a significantly higher tendency to suppress thoughts than those who reported low TSF. Similarly, the high thought suppression group reported higher TSF scores than those who reported low thought suppression (see Table 1 for Mann Whitney U test statistics and significance levels). This may indicate a relationship between TSF and thought suppression (which will be explored later). Finally, those who reported high TSF reported significantly higher depression scores than those who reported low TSF (U =

12621.00, Z = -5.01, p < .001, r = -0.27) and likewise, those who reported high thought suppression reported significantly higher depression scores than the low thought suppression group (U = 13258.00, Z = -3.95, p < .001, r = -0.21). For percentages of clinical cases for each group see table 3.

Table 3.

Percentage of Participants in Each Group who Reported Depression of Clinical Severity.

Severity of Depression	High TSF	Low TSF	High Thought Suppression	Low Thought Suppression
Non Clinical	75.7%	94.6%	78.5%	93%
Mild Depression	17.2%	3.8%	14.4%	5.8%
Moderate Depression	6.5%	1.6%	6.6%	1.2%
Severe Depression	0.6%	0%	0.6%	0%

Interaction Effects

There were no significant interactions between level of TSF and thought suppression on any of the outcome variables. Therefore, the effects of the two independent variables added to each other in a linear way (i.e. the relationship between disordered eating behaviors and TSF did not change according to the level of thought suppression and the relationship between thought suppression and disordered eating behaviors was the same irrespective of the level of TSF). However, those who experienced high TSF and high thought suppression reported more disordered eating behaviours than those who

reported high TSF and low thought suppression, high thought suppression and low TSF, or low TSF and low thought suppression.

Impact of TSF on Disordered Eating Behaviours

A 2x2 ANOVA showed a significant main effect of TSF on participants' reports of the amount of times they had eaten an unusually large amount of food (F (1, 351) = 9.38, p < .05, ω^2 = .03), the percentage of these times that participants' felt they had lost control at the time of eating (F (1, 349) = 49.32, p < .001, ω^2 = .12), the amount of days such episodes of overeating occurred (whereby they had eaten an unusually large amount of food with loss of control; F (1, 347) = 19.94, p < .001, ω^2 = .05), how many times participants reported exercising in a driven/compulsive way to control their shape, weight, amount of fat within them, or burn calories (F (1, 350) = 32.23, p < .001, ω^2 = .08), eating restraint (F (1, 350) = 117.37, p < .001, ω^2 = .25), global ED psychopathology (F (1, 350) = 209.10, p < .001, ω^2 = .37), uncontrolled eating, emotional eating, cognitive restraint (F (1, 350) = 13.12, p < .001, ω^2 = .04, F (1, 350) = 18.42, p < .001, ω^2 = .05, and F (1, 350) = 78.13, p < .001, ω^2 = .18 respectively), and BMI (F (1, 342) = 9.42, p < .05, ω^2 = .03; see Figures 6-15). However, there was no significant main effect of level of TSF on the number of times participants self-induced vomiting or used laxatives to control their shape or weight (F (1, 351) = 2.05, p = ns, ω2 = .01 and F (1, 351) = 2.72, p = ns, ω^2 = .01 respectively; Figures 16-17). Therefore, TSF had a significant main effect on binge-eating behaviours, eating restraint, the amount of times participants exercised in a driven or compulsive way, BMI, and overall ED psychopathology, but not purging behaviours (for means and standard deviations, see Table 4 on page 116). All significant main effects were in a positive direction, with those

with higher levels of TSF reporting higher frequency or tendency to carry out the disordered eating behaviour. TSF had a small effect on all disordered eating behaviours except restraint and global ED psychopathology, which it had a medium effect on (see Table 4 on page 116 for effect sizes)

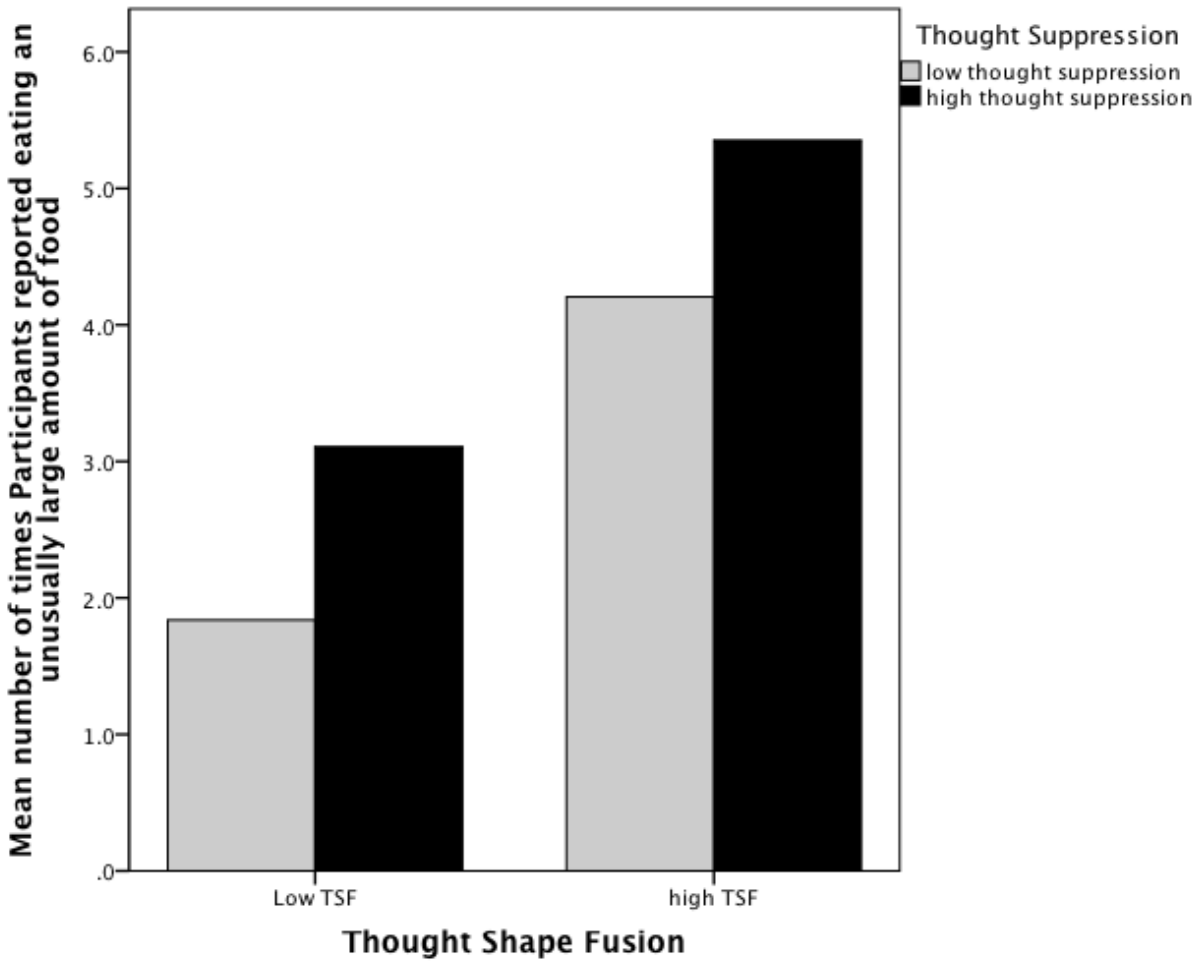


Figure 6. Mean number of times those who reported high and low TSF and high and low thought suppression ate an unusually large amount of food over the previous 28 days.

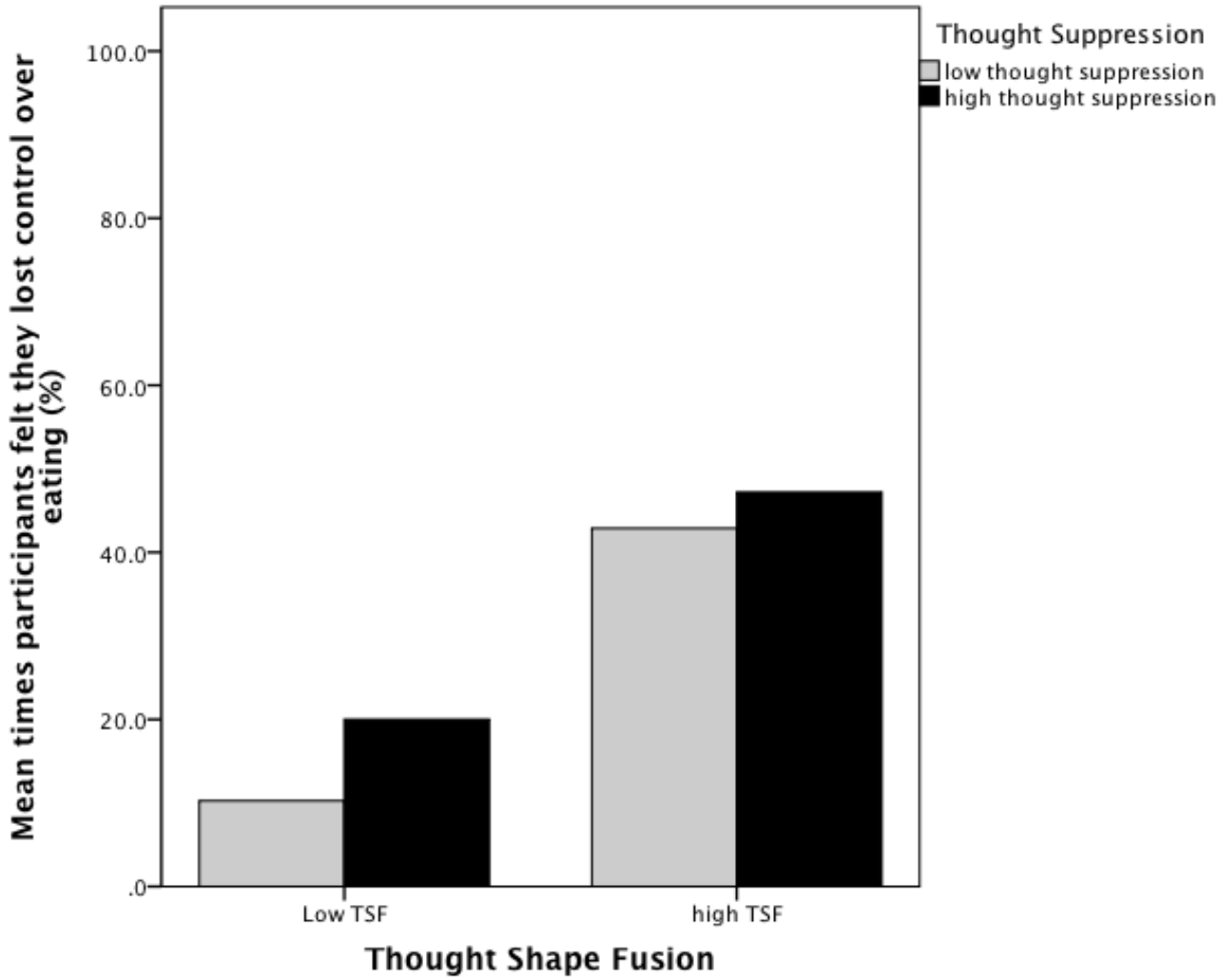


Figure 7. Mean percentage of times those who reported high and low TSF and high and low thought suppression felt they had lost control over eating when they ate an unusually large amount of food.

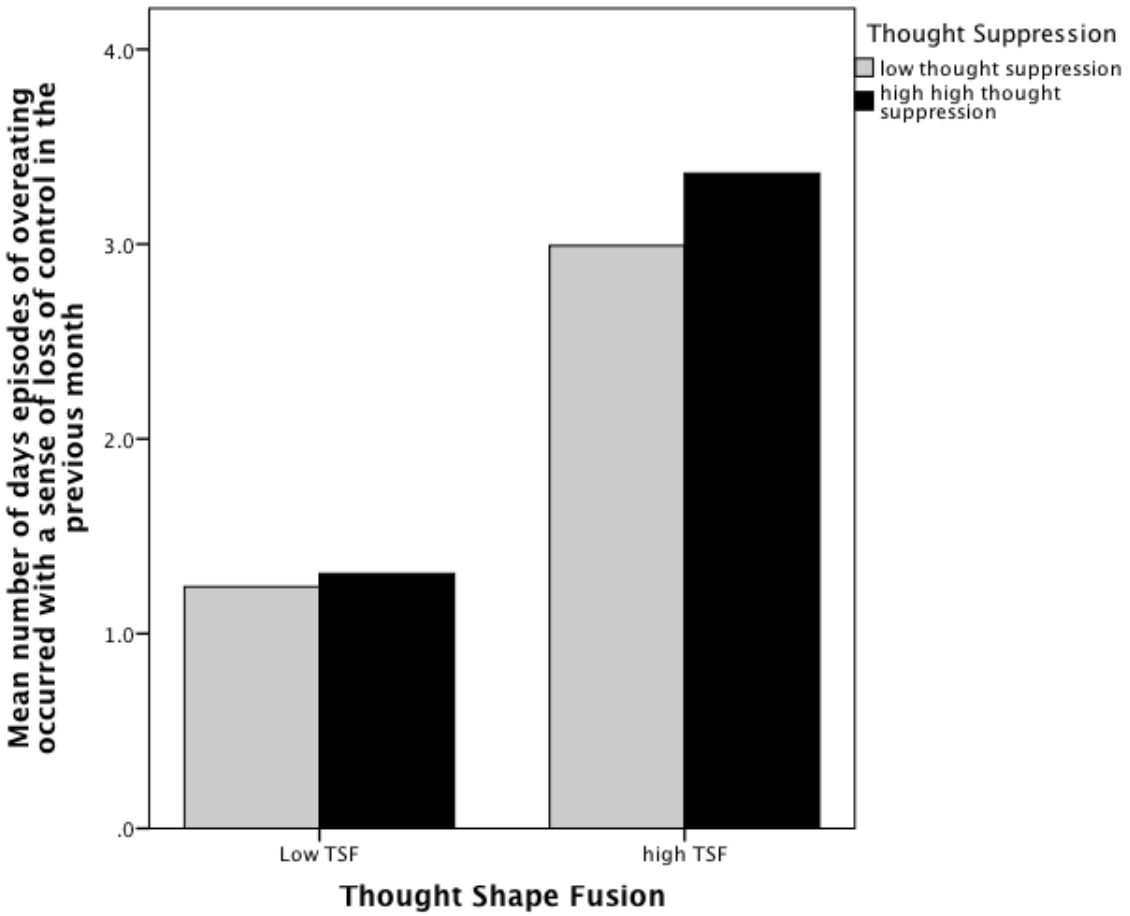


Figure 8. Mean number of days such episodes of overeating occurred for those who reported high and low TSF and high and low thought suppression.

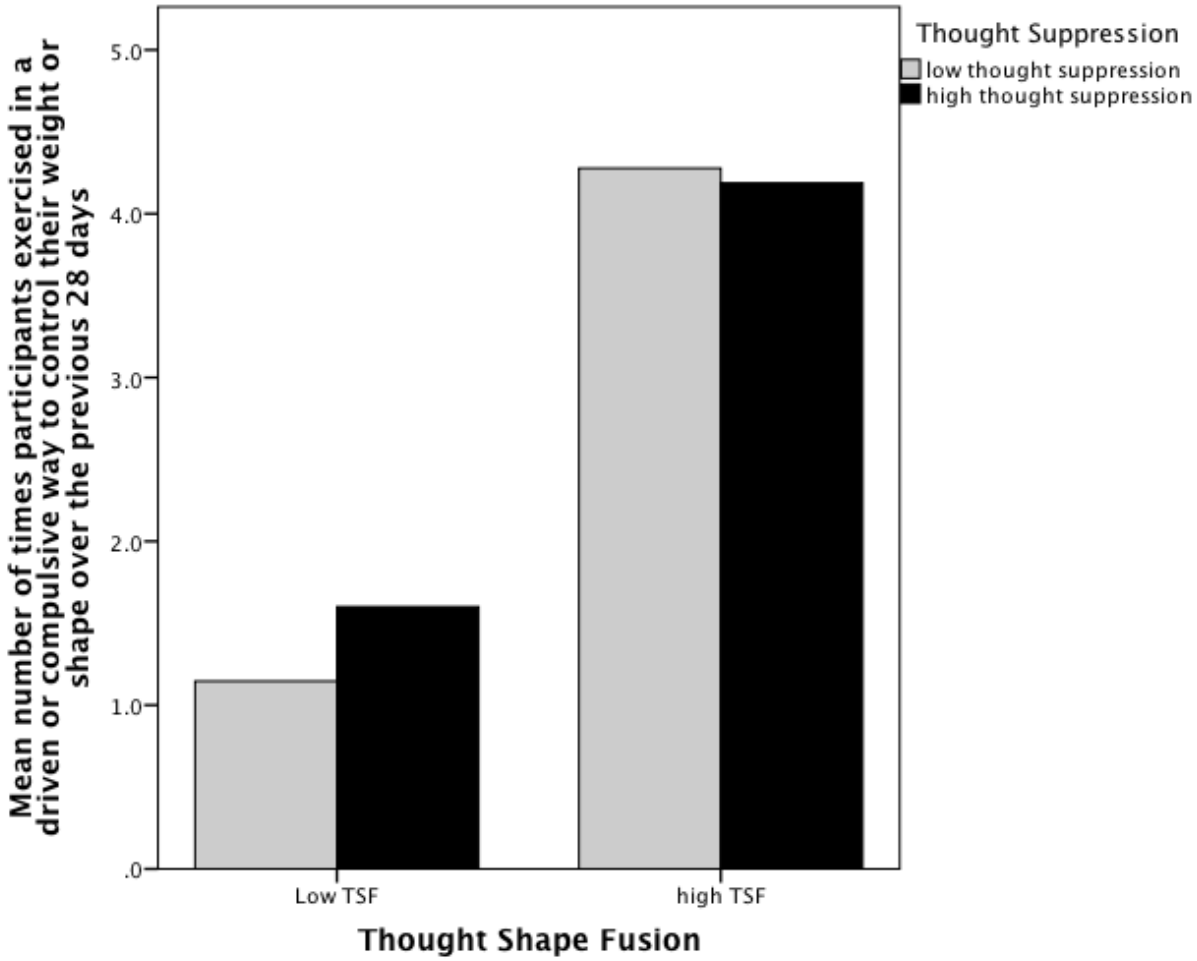


Figure 9. Mean number of times those who reported high and low TSF and high and low thought suppression exercised in a driven/compulsive way to control weight/shape in the previous 28 days.

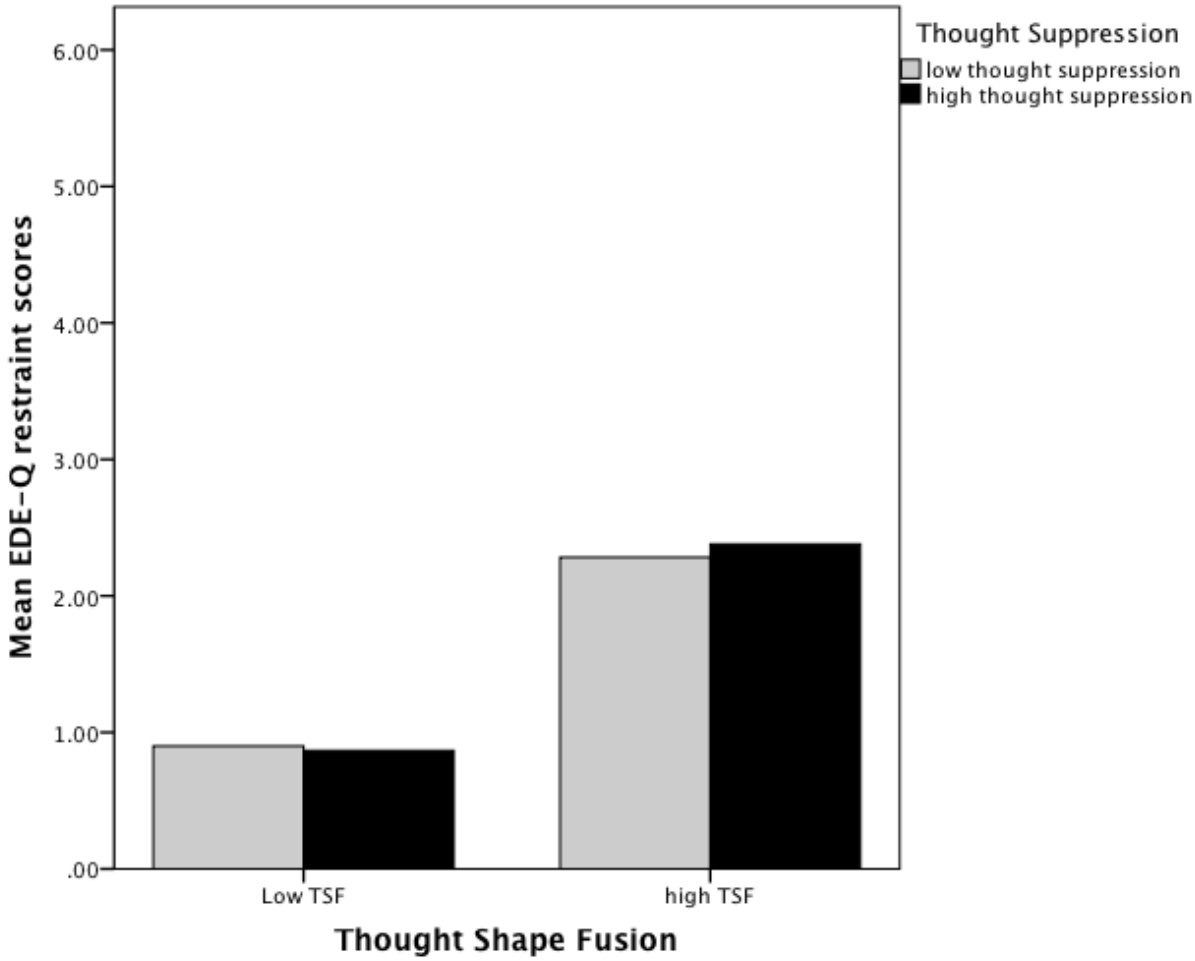


Figure 10. Mean EDE-Q restraint subscale scores for those who reported high and low TSF and high and low thought suppression.

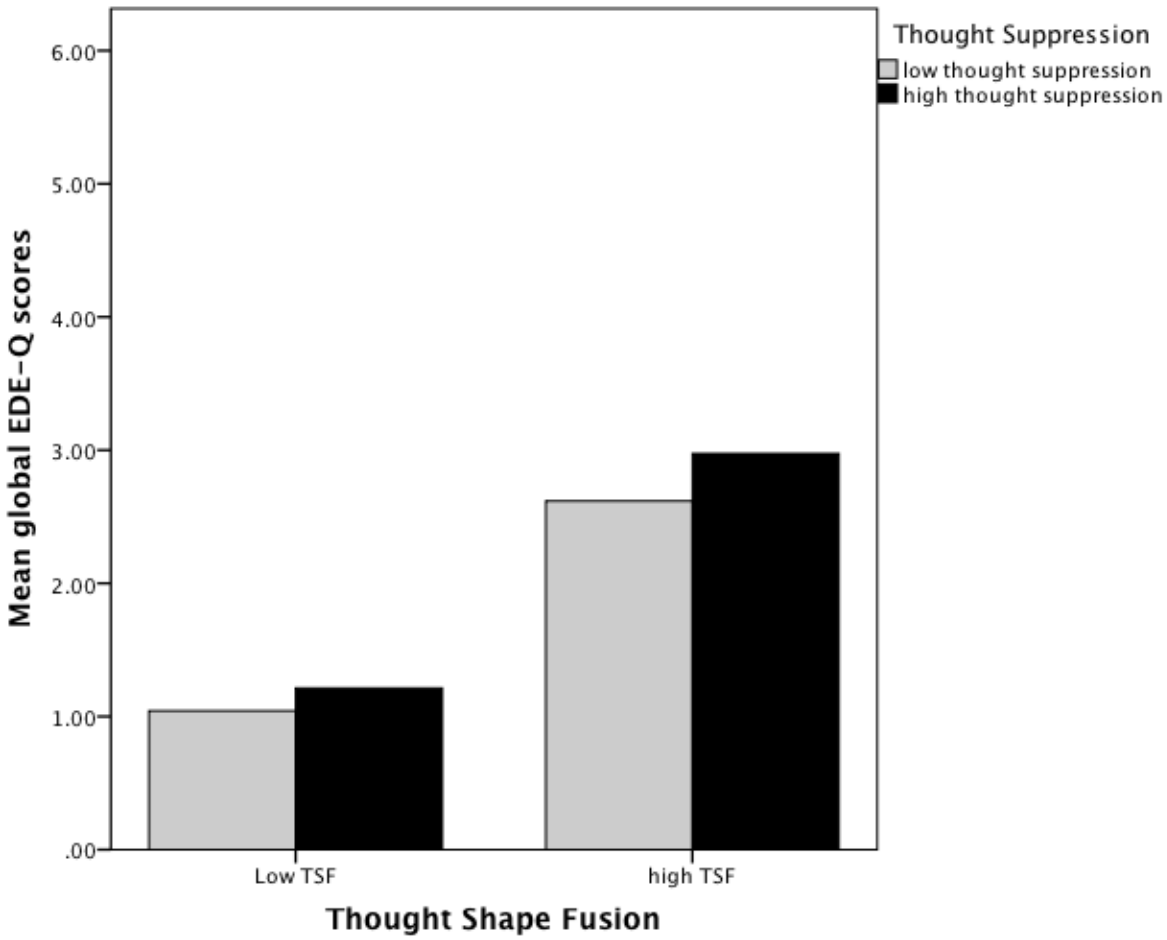


Figure 11. Mean global EDE-Q score for those who reported high and low TSF and high and low thought suppression.

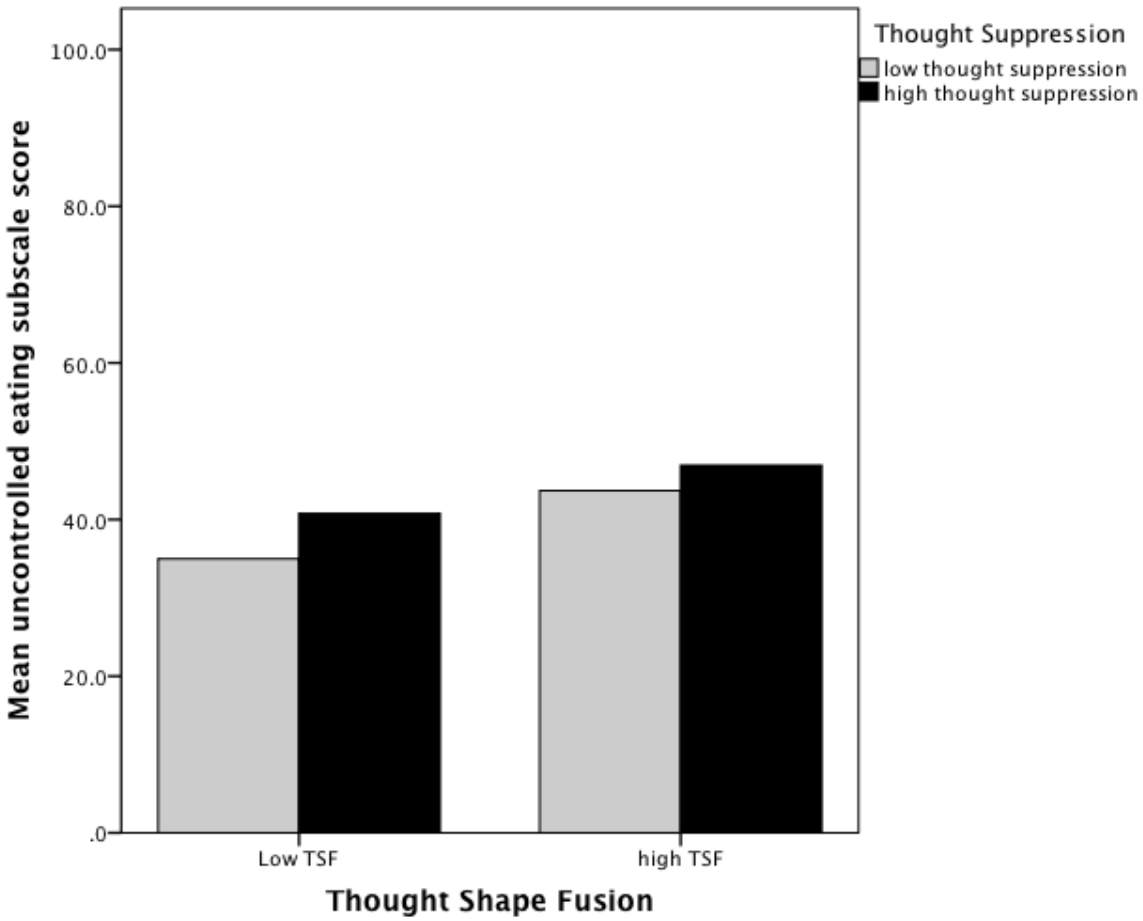


Figure 12. Mean uncontrolled eating subscale scores for those who reported high and low TSF and high and low thought suppression.

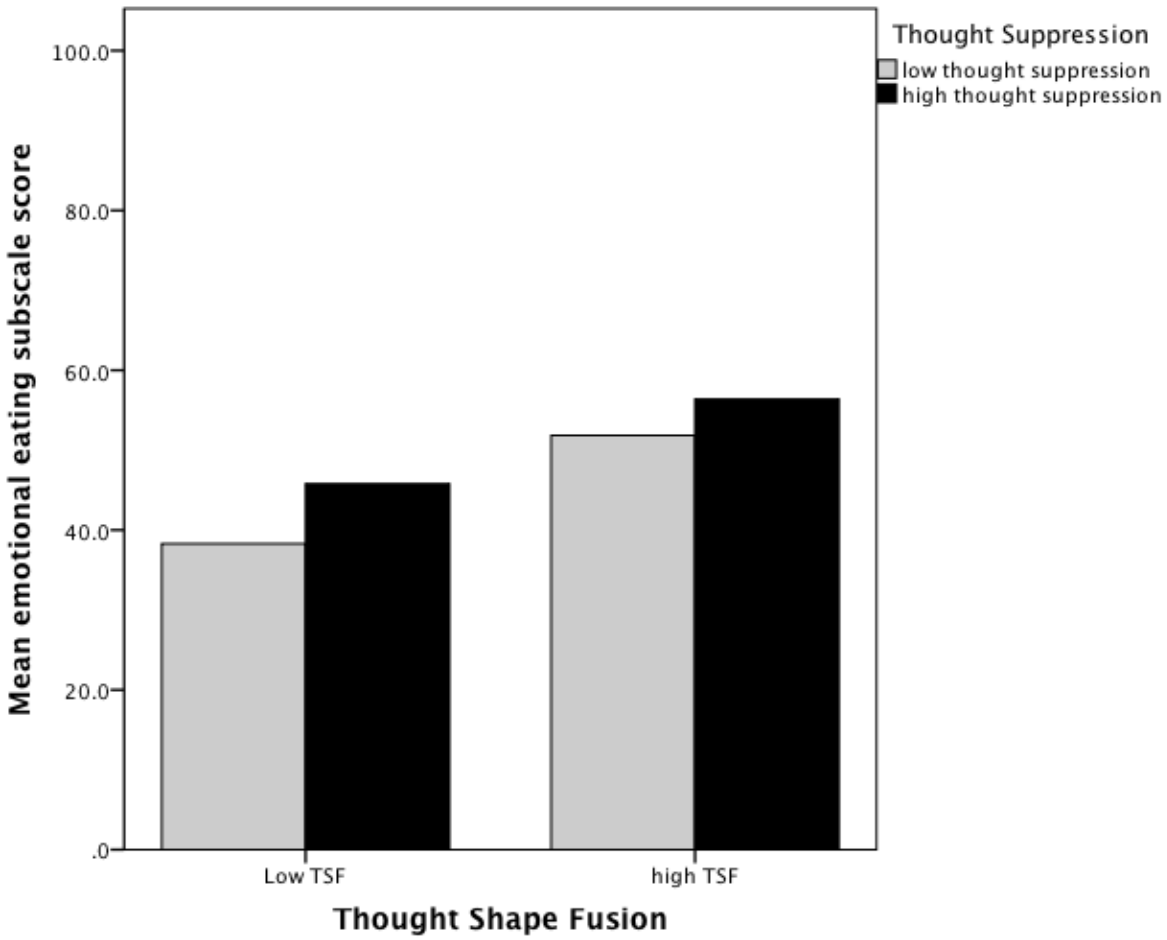


Figure 13. Mean emotional eating subscale scores for those who reported high and low TSF and high and low thought suppression.

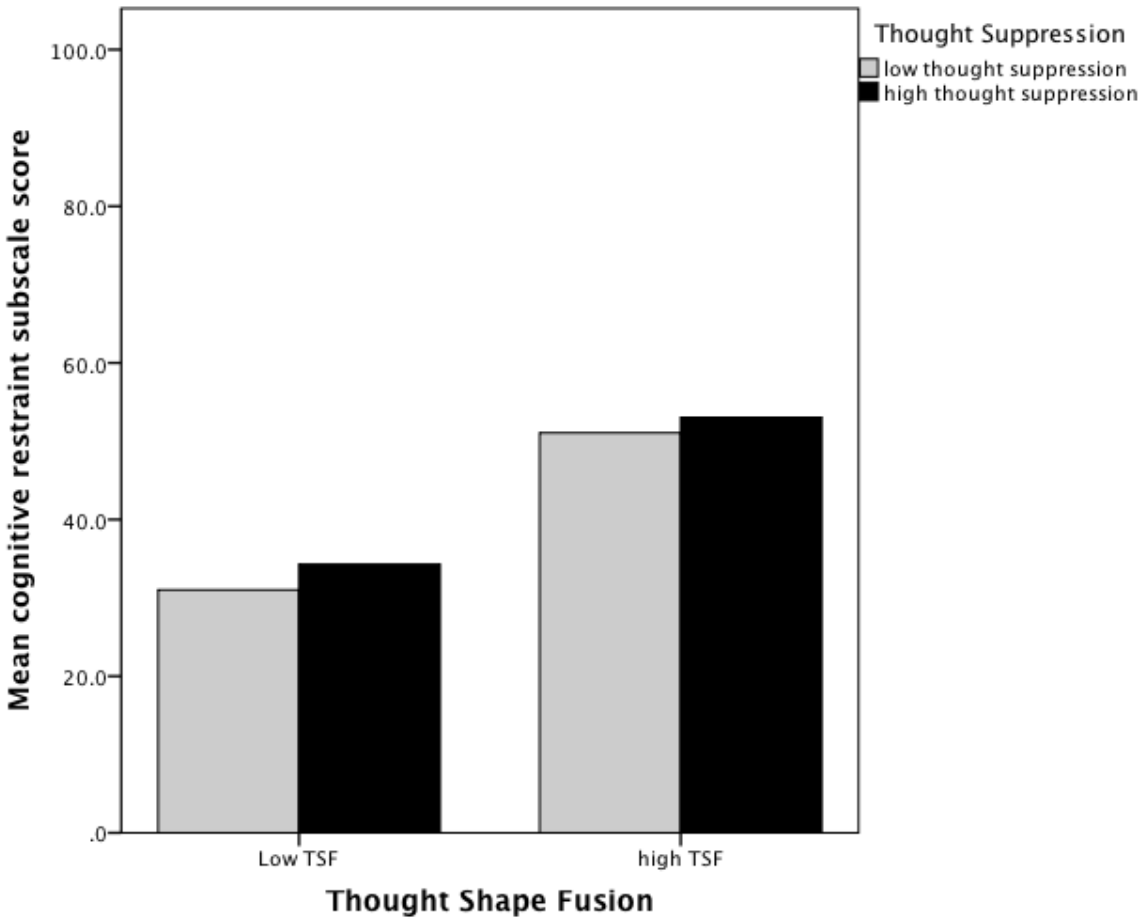


Figure 14. Mean cognitive restraint subscale scores for those who reported high and low TSF and high and low thought suppression.

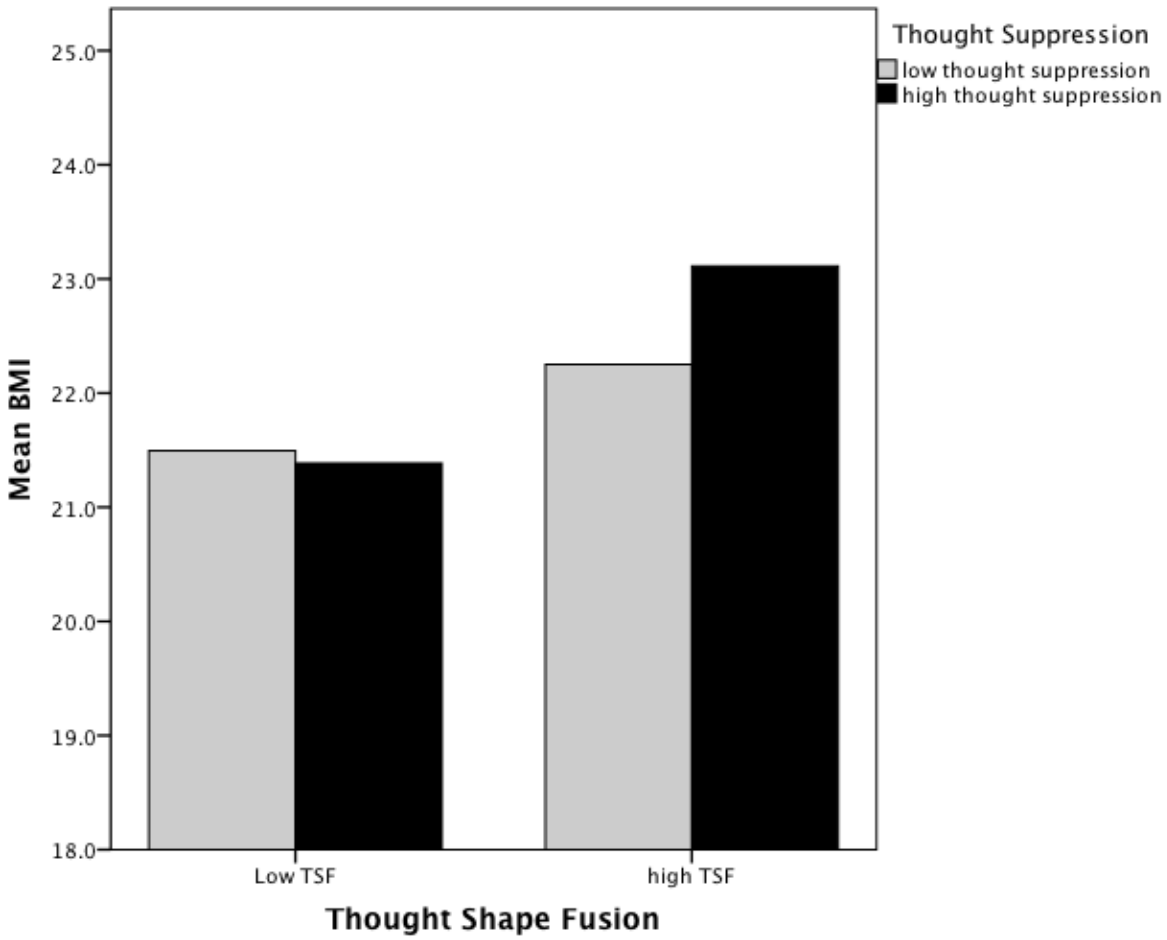


Figure 15. Mean BMIs for those who reported high and low TSF and high and low thought suppression.

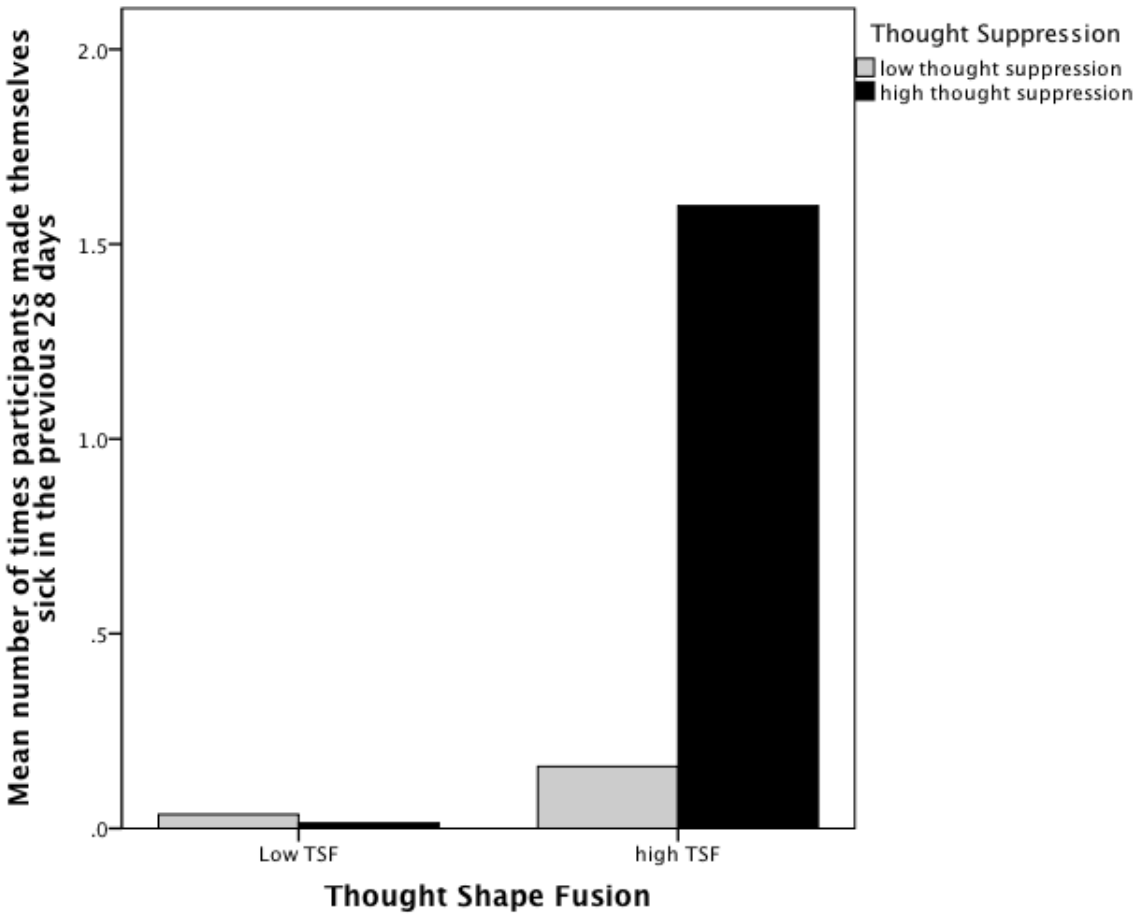


Figure 16. Mean number of times those who reported high and low TSF and high and low thought suppression made themselves sick to control their shape/weight

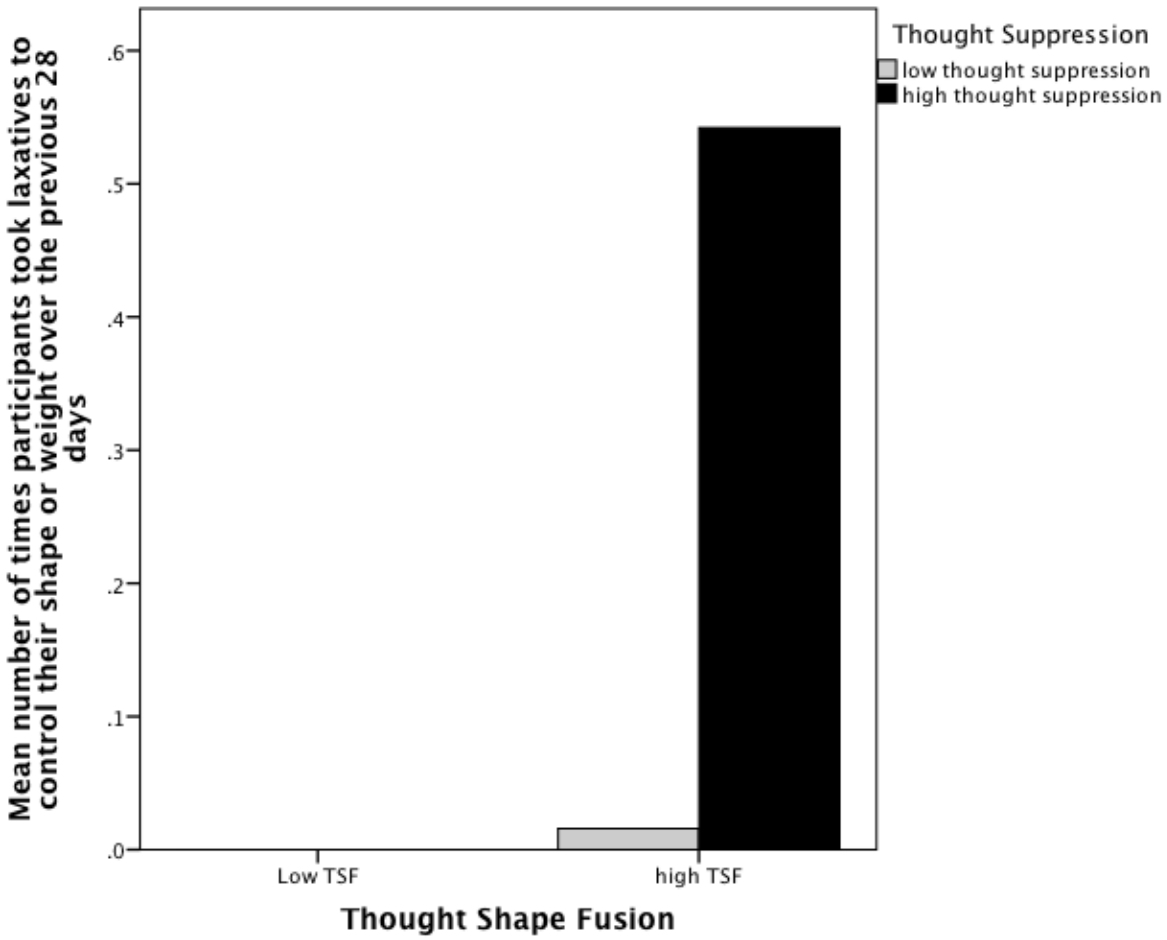


Figure 17. Mean number of times those who reported high and low TSF and high and low thought suppression took laxatives to control their shape/weight

Impact of Thought Suppression on Disordered Eating Behaviours

Thought suppression had a significant main effect on overall ED psychopathology (F (1, 350) = 5.25, $p < .05$, $\omega^2 = .02$; Figure 7), uncontrolled eating, and emotional eating (F (1, 350) = 4.89, $p < .05$, $\omega^2 = .01$; F (1, 350) = 4.58, $p < .05$, $\omega^2 = .01$ respectively; Figures 11-13) only. Table 4 shows means, standard deviations, and effect sizes for all the above comparisons. Thought suppression had a small effect on all disordered eating

behaviours. The effect sizes suggest TSF may have had a greater influence on disordered eating behaviours and overall ED psychopathology than thought suppression. Again, all significant main effects were in a positive direction, with those reporting higher thought suppression reporting higher frequency or tendency to carry out the disordered eating behaviour.

Table 4.

Number of Participants that Experienced Each Behaviour, and *Means (M), Standard Deviations (SD), F values, and Effect Sizes (ω^2) for All Outcome Variables.*

	High TSF N (%) (M, SD)	Low TSF N (%) (M, SD)	High Thought Suppression N (%) M (SD)	Low Thought Suppression N (%) M (SD)	*F* value (effect sizes; ω^2) for TSF	*F* value (effect sizes; ω^2) for Thought Suppression
How many times over the past 28 days participants ate an unusually large amount of food	125 (73.5) 4.93 (9.27)	100 (54.1) 2.35 (3.52)	123 (68) 4.44 (8.95)	102 (58.6) 2.66 (3.94)	9.38 (.03)*	2.58 (.01)
Percentage of these times participants felt they lost control (when eating an unusually large amount of food)	90 (53.3) 45.59 (46.03)	37 (20.1) 14.13 (31.02)	78 (53.6) 36.12 (44.21)	49 (28.2) 22.07 (38.31)	49.32 (.12)***	2.73 (.01)
Number of days in the past 28, such episodes of overeating occurred (i.e. participants ate an unusually large amount of food and had a sense of loss of control	103 (61.3) 3.23 (4.95)	66 (36.1) 1.27 (2.49)	95 (53.1) 2.53 (4.49)	74 (43) 1.88 (3.36)	19.94 (.05)***	.27 (.00)

at the time)						
Number of times over the past 28 days participants made themselves sick to control their weight and/or shape	22 (12.9) 1.07 (7.89)	3 (1.6) .03 (.22)	16 (8.8) .95 (7.65)	9 (5.2) .08 (.36)	2.05 (.01)	1.41 (.00)
Number of times over the past 28 days participants took laxatives to control their shape and/or weight	10 (5.9) .35 (2.25)	0 (0.0) .00 (.00)	9 (5) .32 (2.18)	1 (0.6) .01 (.08)	2.72 (.01)	2.42 (.01)
Number of times over the past 28 days participants exercised in a driven/compulsive way to control shape and/or weight	99 (58.2) 4.22 (5.70)	47 (25.5) 1.33 (3.26)	82 (45.3) 3.13 (5.11)	64 (37) 2.29 (4.15)	32.23 (.08)***	.13 (.00)
EDE-Q restraint subscale	162 (95.3) 2.34 (1.39)	132 (71.7) .89 (1.04)	154 (85.1) 1.76 (1.47)	140 (80.9) 1.40 (1.35)	117.37 (.25)***	.06 (.00)
EDE-Q global score	- 2.84 (1.21)	- 1.11 (.90)	- 2.25 (1.40)	- 1.62 (1.25)	209.10 (.37)***	5.25 (.02)*
TFEQ (R-18) cognitive restraint	168 (98.8)	171 (92.9)	174 (96.1)	165 (95.4)	78.13 (.18)***	1.46 (.00)

subscale	52.32 (20.06)	32.34 (20.06)	45.40 (23.48)	38.31 (20.64)		
TFEQ (R-18) uncontrolled eating subscale	167 (98.2) 45.73 (20.56)	181 (98.4) 37.32 (17.08)	179 (98.9) 44.42 (20.29)	172 (99.4) 38.15 (17.64)	13.12 (.04)***	4.89 (.01)*
TFEQ (R-18) emotional eating subscale	161 (94.7) 54.71 (26.51)	163 (88.6) 41.30 (25.23)	166 (91.7) 52.06 (27.03)	158 (91.3) 43.22 (25.60)	18.42 (.05)***	4.58 (.01)*
BMI	- 22.78 (3.45)	- 21.45 (3.85)	- 22.39 (4.13)	- 21.77 (3.24)	9.42 (.03)*	.86 (.00)

*$P < .05$, **$p < .01$, *** $p < .001$ with regard to main effect of TSF or thought suppression on outcome variable

Correlations

As 25 correlations were carried out between TSF, thought suppression, and the outcome variables discussed, an appropriate Bonferroni corrected critical *p* value would be $p < .002$. All correlations met this value, apart from the relationship between thought suppression and how many times participants made themselves sick ($r = .14$, $p = .004$) or how many times participants exercised in driven/compulsive way to control their weight or shape ($r = .15$, $p = .002$). All other significant correlations reached *p* values of ≤ .001. In line with the hypotheses, TSF significantly correlated with all outcome variables. Thought suppression significantly correlated with all outcome variables apart from BMI ($r = .07$, $p > .05$). TSF significantly correlated with thought suppression ($r = .35$, $p < .001$). See Table 5 for r values.

Table 5.

Details of R Values and Significance Levels for Correlations Between TSF, Thought Suppression, and Outcome Variables.

Outcome Variable	*r* value for Thought Shape Fusion	*r* value for Thought Suppression
How many times over the past 28 days participants ate an unusually large amount of food	.26***	.17***
Percentage of these times participants felt they lost control (when eating an unusually large amount of food)	.43***	.22***
Number of days in the past 28, such episodes of overeating occurred (i.e. participants ate an unusually large amount of food and had a sense of loss of control at the time)	.33***	.17***
Number of times over the past 28 days participants made themselves sick to control their weight and/or shape	.29***	.14**
Number of times over the past 28 days participants took laxatives to control their shape and/or weight	.19***	.17***

Number of times over the past 28 days participants exercised in a driven/compulsive way to control shape and/or weight	.36***	.15**
EDE-Q restraint subscale	.60***	.20***
EDE-Q global score	.72***	.32***
TFEQ (R-18) cognitive restraint subscale	.51***	.23***
TFEQ (R-18) uncontrolled eating subscale	.27***	.18***
TFEQ (R-18) emotional eating subscale	.32***	.21***
BMI	.29***	.07
Thought Shape Fusion	-	.35***
Thought Suppression	.35***	-

*$p \leq .05$ **$p \leq .01$ ***$p \leq .001$

Discussion

Overall Findings

To the author's knowledge, this was the first study looking at a potential relationship between TSF and thought suppression and whether both influence disordered eating behaviours. This was important in further understanding the relationship between OCD and EDs, which together with the debate over whether thought suppression plays a role in disordered eating behaviours, has been somewhat controversial. In line with previous research, the current study showed a correlation between TSF and ED psychopathology (e.g. Shafran & Robinson, 2004). Contrary to the hypothesis, there were no significant interaction effects between TSF and thought suppression on disordered eating behaviours, though inspection of the effect sizes (Table 4) showed TSF had a greater effect on them than thought suppression. The separate main effects of TSF and thought suppression on disordered eating behaviours, together with the graphs (Figures 6-17) and no interaction effect, implies that thought suppression may increase disordered eating behaviours, when used as a cognitive coping strategy alongside TSF.

The results also showed that there was a main effect of TSF on self-reported disordered eating behaviours, including eating restraint, binge-eating behaviours, and overall ED psychopathology, but not on purging behaviours (self-induced vomiting and laxative misuse). However, there was a main effect of TSF on the number of times participants exercised in an excessive or driven way to influence weight or shape. As exercise and purging behaviours share common functions in EDs and disordered eating, such as managing negative affect in the short-term (e.g. Goodwin, Haycraft, Willis, & Meyer, 2011; Thome & Espelage, 2004) and controlling shape and weight (e.g. Fairburn

et al., 2003; Goodwin et al., 2011), these findings may be better explained by sample characteristics; for example, a female university sample may be more likely to carry out exercise (rather than purging behaviours), in comparison with the general population, possibly due to greater availability of team sports or differences in societal norms. Alternatively, exercise might have been used as a way of managing stress (Thome & Espelage, 2004) or guilt around eating and that in a clinical sample (where frequency of behaviours may be higher[43]), a significant main effect may also be found between TSF and laxative misuse and/or vomiting. If this is true, increased feelings of fatness, moral wrong-doing (guilt), and perceived likelihood of weight gain might trigger compensatory behaviours to reduce them. Research has shown excessive exercise to precede onset of an ED and can be one of the last symptoms to subside after treatment (Taranis, Toyz, & Meyer, 2011), therefore alongside other disordered eating behaviours the main effect of TSF on exercise could possibly aid identification of those more vulnerable to developing an ED. It could also be important to determine whether treating TSF reduces levels of exercise in those with an ED. However, as this study did not investigate the function of exercise, further exploration is required to understand this relationship fully.

Regarding thought suppression and disordered eating behaviours, unlike the overall main effect of TSF, thought suppression only had a significant main effect on binge-eating behaviours (uncontrolled eating and emotional eating) but not on eating restraint or compensatory behaviours, which partly supported the hypothesis and previous research (e.g. Barnes & Tantleff-Dunn, 2010; Harnden et al., 1997; Soetens et al., 2008). Therefore, these findings are perhaps best explained by a paradoxical

[43] See Table 4 for mean frequency of behaviours carried out in this sample and the number of participants that carried out each behaviour.

increase in food-related thoughts translating into behavior (i.e, greater consumption of the food; Johnston et al., 1997), as opposed to the increase in thoughts leading to greater restriction and subsequently binge-eating patterns (due to physiological changes and cognitive processes; Harnden et al., 1997). However, it is possible that those who reported binge-eating behaviours may have previously dieted due to reasons unrelated to thought suppression, thus the physiological effects of restricted eating cannot be ruled out.

Another explanation for these findings could be that higher feelings of distress (as a result of thought suppression) may trigger bingeing to block the emotion (Lavender et al., 2009), thus the main effect of thought suppression on binge-eating behaviours but not eating restraint may be due to mood intolerance (Fairburn et al., 2003). This is supported by thought suppression and TSF having a significant main effect on emotional eating. Lavender et al. (2009) suggested binge-eating behaviours (and compensatory behaviours) are often a means of avoiding unpleasant emotional states and research has shown TSF to be associated with increased anxiety and guilt (Coelho et al., 2008a; Jauregui-Lobera et al., 2011; Kostopoulou et al., 2011; Radomsky et al., 2002; Shafran et al., 1999). Greater thought suppression has also resulted in increased distress (Oliver & Huon, 2001). Therefore, participants may have turned to food as a means of coping with these emotions. Waller et al. (1997) also conceptualized this in terms of disordered eating patterns leading to an inability to rely on physical hunger as a signal of when to eat, as signals become less reliable due to physiological changes (such as delayed gastric emptying after a restricted diet) and the effect of emotions (for example, anxiety may suppress hunger due the fight or flight response). Therefore, if TSF increases anxiety and guilt, and thought suppression leads to greater distress, together with physiological changes from disordered eating patterns, it seems

plausible that participants who reported high thought suppression may have reported higher binge-eating behaviours as a means of coping with distress.

Furthermore, loss of control is a key aspect in binge-eating behaviours (APA, 2000) and as mentioned, thought suppression is a cognitive control strategy, thus control may further explain the association between these factors. Wegner's (1994) theory of thought suppression suggests people tend to have less control over their thoughts (and perhaps behaviours) when trying not to think of something, as they are trying to engage in a feature-negative search. As the monitoring process would be simultaneously searching for the thought, because the feature-positive search is likely to be easier, it may result in a rebound effect when thoughts of food, weight, and/or shape enter into consciousness. This could lead to sense of loss of control over thoughts. This may also translate into behavior, as the individual trying not to eat certain foods may also feel a sense of loss of control if they were to eat them. However, this feeling may also relate to not being able to resist food due to physiological effects of starvation (Waller et al., 2007) rather than thought suppression. Perhaps the latter explanation is more likely as there was no significant main effect of thought suppression on loss of control over eating according to the EDE-Q, however there was when looking at uncontrolled eating according to the TFEQ. The TFEQ measures loss of control over eating particularly when hungry or exposed to external stimuli (HRQL group, 2000).

Interestingly, there was also a main effect of TSF but not thought suppression on BMI, and TSF significantly positively correlated with BMI whereas thought suppression did not. This is a particularly interesting finding as Coelho et al. (2012c) suggested that overweight individuals could be less susceptible to TSF whereas this study showed TSF to have a bigger effect on eating restraint than binge eating behaviours. One possible explanation for this could be that those with a higher BMI could have more concerns

over their weight and shape and experience more TSF, which might trigger more dieting and restrained eating behaviours. A longitudinal study could be useful in determining whether TSF leads to restrained eating behaviours or eating restraint leads to TSF. Unfortunately this study did not focus on differences between those who reported being overweight and normal weight, thus it is still possible that overweight individuals may be less susceptible to TSF and the positive correlation between TSF and BMI may exist within the normal range of BMIs (18-25). Shafran and Robinson (2004) also found in participants with and without a clinical ED, TSF no longer correlated with BMI when controlling for depression. Therefore, the significant main effect between TSF and BMI in this study could be due to symptoms of depression. Although Shafran and Robinson (2004) suggested depression may affect some of the questions on the TSFQ, it is also important to note that the analysis highlighted that depressive symptoms may be a core feature of TSF (24.3% of those who reported high TSF and 21.5% of those who reported high thought suppression in this sample reported clinical levels of depression according to the HADS), meaning controlling for depression may result in loss of a core part of the construct. Thus, it is important to consider the reasons for controlling for depression and the impact this may have on the outcome.

Finally, in partial support of the hypotheses, TSF and thought suppression independently correlated with all other outcome variables. Of particular interest is that thought suppression positively correlated with eating restraint but had no main effect on this outcome. This could show that on some level in a non-clinical sample there is a relationship between thought suppression and eating restraint, but when looking at significant differences between the groups, other reasons may explain the non-significant findings (such as sample characteristics). TSF and thought suppression were also positively correlated, which adds support to the notion that disordered eating

behaviours linearly increased in accordance with a higher reported level of TSF *and* thought suppression.. However, there is no evidence to suggest people are suppressing thoughts to do with eating, shape or weight. Therefore, the correlations may have occurred due to other factors, such as low mood.

In terms of relating these findings back to the original discussion as to whether EDs and OCD psychopathology may overlap, Rassin et al.'s (2000) study found TAF and thought suppression interacted and resulted in greater obsessive-compulsive symptoms. This study found no interaction between TSF and thought suppression, however it did show that TSF may have had a greater influence on disordered eating behaviours than thought suppression, which is in line with Rassin et al.'s (2000) findings that TAF also had a more influential role in obsessive-compulsive symptoms than thought suppression. A recent study by Coelho et al. (2013) highlighted that in a sample of students, thought suppression did not predict TSF in exploratory stepwise regression analyses, though TSF and thought suppression were significantly associated. This supports the findings from this study, as there was no significant interaction between TSF and thought suppression regarding disordered eating behaviours, however they were significantly correlated. Therefore, whilst there may be some similarities between TSF, thought suppression, and disordered eating behaviours, and the relationship between TAF, thought suppression, and obsessive-compulsive symptoms, there are also some differences.

Clinical Implications

Based on these findings, TSF may be an important construct to address regarding disordered eating behaviours both in the general population and possibly in treatment

of individuals with EDs. Thought suppression may also need to be addressed where individuals experience severe disordered eating behaviours (though further research is needed to decipher this in a clinical population). It is important to be aware that if thought suppression is addressed in treatment without TSF, the behaviours may continue, whereas if TSF is addressed without thought suppression, both thought suppression and disordered eating behaviours may reduce. However, it may still be worth attending to thought suppression in treatment where appropriate, to prevent it being used as a default coping strategy. Also, there may be a greater need to address thought suppression and TSF in binge-eating behaviours rather than eating restraint, however the need to target either in relation to compensatory behaviours is somewhat less clear.

Research has not yet established how TSF might be addressed in treatment, however Coelho et al. (2013) established some factors that may be involved in the development and maintenance of TSF (such as eating pathology, body dissatisfaction, TAF, and depression), which they suggest is an important step towards developing a model of TSF. As TSF was derived from TAF theory, it may be helpful to look at how TAF is addressed in treatment for possible avenues to explore in in relation to TSF; for example, likelihood TAF can be addressed through challenging the belief an event is more likely to occur from having a particular thought via behavioural experiments. Similarly, behavioural experiments could be used to challenge beliefs that thinking about a fattening food leads to weight gain, however further research would be needed to establish whether this would be effective. As thought suppression is not considered a clinical disorder but a maintenance factor in many anxiety disorders (Stott, Mansel, Salkovskis, Lavender, & Cartwright-Hatton, 2010), there are no specific treatments aimed at addressing this either; however, certain techniques are believed to be

effective, particularly the use of metaphors to highlight the effect of not suppressing thoughts (Stott et al., 2010); Acceptance and Commitment Therapy (ACT) often uses metaphors to highlight the struggle that occurs as a result of trying to control thoughts (Harris, 2009). Overall, it is key for clinicians to be aware of the impact these factors *may* have on EDs so that they can tailor treatments to address them if helpful to the client, though further research is needed to determine how these constructs might be effectively reduced through ED treatments. If these constructs do require treatment, it may be helpful to incorporate them into the formulation model (e.g Fairburn et al., 2003). This highlights a major gap in current theory, as the models used do not account for cognitive control strategies nor cognitive biases other than perfectionism, which findings from this research suggest may have a role to play.

Limitations

Although this study had strengths in terms of sample size, comparability of findings, validity, and reliability of questionnaires, as well as perhaps being the first to explore the impact of TSF and thought suppression on disordered eating behaviours, the study also had some limitations. Firstly, the impact of thought suppression on cognitions associated with ED psychopathology was not investigated, as research into TSF and ED psychopathology has already focused on this area in detail (e.g. Shafran et al., 1999). However, it may have been useful to look at the effect of TSF and thought suppression on weight and shape concerns, as this may have provided further explanation for the findings.

Secondly, although there was no significant main effect of thought suppression on eating restraint or compensatory behaviours, it seems thought suppression

significantly correlated with them, which could be due to the sample used. These findings may be worth exploring further in a clinical sample where the behaviours may be carried out more frequently.

Thirdly, whilst this study highlighted where differences and associations may exist, manipulating TSF and thought suppression rather than using self-report measures could have helped to ensure people were experiencing both and that thought suppression related to thoughts of food. Barnes and Tantleff-Dunn (2010) suggested food thought suppression could not wholly be accounted for by thought suppression generally, therefore the WBSI may not provide the most accurate measure of the relationship between thought suppression and eating behaviors. Another way to address this could have been to use different or additional measures, such as the Food Thought Suppression Inventory (Barnes & Tantleff-Dunn, 2010), which measures an individual's tendency to suppress food-related thoughts. However, this study was more interested in thought suppression as a cognitive coping strategy, rather than looking specifically at the types of thoughts involved. Also, manipulating thought suppression is a difficult outcome to measure, as according to Wegner's (1994) theory, following the standard protocol of asking people to press a button when a thought occurs (e.g. Oliver & Huon, 2001) encourages people to enter into a positive-feature search as well as a negative-feature search and as the positive-feature search is easier to carry out, people may appear as though they are able to suppress thoughts because they are searching for them rather than pushing them away.

Fourthly, whilst the EDE-Q and TFEQ have been widely used to measure ED psychopathology and behaviours (e.g. Barnes et al., 2011; Oliver & Huon, 2001), many others may have provided additional insight into disordered eating behaviours. For example the Bulimia Test Revised (Thelen Farmer, Wonderlich, & Smith, 1991) may

have identified symptoms such as eating in secret, which the EDE-Q only measures in relation to episodes unrelated to binge-eating. The Dutch Eating Behaviour Questionnaire (Van Strien, Frijters, Bergers, & Defares, 1986) may also have been useful, however this questionnaire does not measure the frequency of behaviours. Furthermore, the Eating Disorders Inventory-2 (Garner, 1991) is also commonly used to screen for those who may present with an ED based on DSM-IV-TR (APA, 2000) criteria, however the EDE-Q focuses more on frequency of ED behaviours rather than beliefs, which was more related to the aim of this study. Whilst the TFEQ, was beneficial in looking at eating behaviours not addressed by the EDE-Q, such as emotional eating and uncontrolled eating in relation to hunger and external cues, unfortunately the author's attention was drawn to a newer version of the questionnaire after the study had commenced. The newer questionnaire (TFEQ R-21; Cappelleri, 2009) aimed to reduce floor and ceiling effects on the emotional eating subscale in the 18-item version. Therefore, findings concerning the emotional eating subscale in this study may not be valid; future studies should use the TFEQ-21.

Fifthly, a median split was used to classify participants according to high or low TSF and thought suppression. Whilst this is a commonly used method to investigate differences in a sample according to differing levels of independent factors, it means dichotomizing continuous data, which does come with drawbacks. For example, it can lead to loss of information about individual differences and a reduction in effect sizes (effect sizes are likely to be larger if correlating two continuous variables compared with two variables that have dichotomized; MacCallum, Zhang, Preacher, & Rucker, 2002), which may result in misleading findings.

Sixthly, participants were excluded if they completed the questionnaires too quickly, as they may not have been completed accurately. Given that those who had high

thought suppression completed the measures more quickly than the other groups of participants, it could be possible that those who were excluded from the analyses were keen to supress thoughts. However, exploratory data for those participants shows they would have been allocated to the low thought suppression group (M= 44.4, SD = 5.8 for WBSI scores).

Finally, there were many options for data analysis, as Appendix J shows. Perhaps carrying out regression analysis or MANOVAs would have reduced the chances of Type I error or may have provided more detail on the predictability of variables, however the analyses conducted in the present study were a computationally straightforward way of investigating the predicted interactions. Furthermore, ANOVAs and regression are conceptually the same procedure (Field, 2005), thus whilst regression may be used for future research with a clinical sample, at this stage an ANOVA was an appropriate and effective way to determine whether there were any findings worth exploring further. Nonetheless, it is important to emphasise that one cannot infer any causal relationships from this data.

Conclusion

Overall, the findings suggest TSF and thought suppression may impact on disordered eating behaviours, particularly binge-eating behaviours. TSF appears to have a greater role in all disordered eating behaviours than thought suppression, particularly eating restraint. It seems thought suppression may add to the effect of TSF, particularly with regard to binge-eating behaviours, however the outcome regarding compensatory behaviours remains unclear. Unfortunately, conclusions cannot be drawn as to whether TSF and thought suppression play a causal role in these findings due to the nature of the study, though one can infer that differences exist in terms of eating behaviours according to levels of TSF and thought suppression in this sample. Future research would be well placed investigating the impact of thought suppression and TSF on eating behaviours in a clinical sample, with a particular focus on the role of emotions. It may also be helpful to look at whether variables predict outcomes through regression analysis and perhaps manipulating TSF and thought suppression to ensure thought suppression relates to food, eating, shape, and weight concerns.

APPENDICES

Appendix A. Table Summarising Aims, Hypotheses, and Methodology Used in Each Study Reviewed.

Title of paper (authors, year of publication)	Aims and hypotheses	Participants	Was TSF induced experimentally?	Was the study a RCT? If so what conditions were included?	Measures used
A cognitive distortion associated with eating disorders: thought-shape fusion (Shafran, Teachman, Kerry, & Rachman, 1999).	**Aims**: *Study 1:* To investigate the construct and measurement of TSF and determine its association with ED psychopathology, obsessive compulsive problems, and depression. *Study 2:* To answer the following: can TSF be made explicit in a lab setting? What behaviour is associated with the distortion? Does the questionnaire have predictive validity? **Hypotheses**: TSF is associated with the psychopathology of eating disorders. Eliciting TSF in an experimental situation would lead to predicted psychological effects. TSF can be made explicit in a lab setting.	*Study 1:* 119 undergraduate students. Their mean age was 20.7 years (SD=4.3); 77% were female. *Study 2:* 30 undergraduate students who endorsed significant levels of at least one of the three components of TSF. Their mean age was 21.3 years (SD=5.3); 87% were female.	*Study 1:* No, it was a questionnaire study. *Study 2:* Yes, participants were given relaxation training until their anxiety was 30 points or less on a scale from 0 (not at all) to 100 (extremely). They were asked to think of an extremely fattening food and complete the following sentence "I am eating____", by filling in the name of the food. They were asked to keep thinking of the image until their anxiety was 20 points higher than baseline.	No, a within participants experimental design was used.	Studies 1 and 2: Thought-Shape Fusion Questionnaire (TSFQ Shafran et al., 1999); Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994); Thought-Action Fusion Scale (TAF Scale; Shafran et al., 1996); Maudsley Obsessive-Compulsive Inventory (MOCI; Hodgson & Rachman, 1977); Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979).
Thought-shape fusion in Anorexia Nervosa: an	**Aims:** To explore the occurrence and extent of TSF in a clinical sample of patients with Anorexia Nervosa.	Twenty female in-patients in an eating disorders unit. All had received a diagnosis of	Yes. Participants were asked to think about a food(s) they considered to be extremely	No, the design was the same as was used in the study by Shafran et al. (1999).	TSFQ (Shafran et al., 1999); TAF scale (Shafran et al., 1996; Rassin, Merckelbach, Muris, &

experimental investigation (Radomsky, De Silva, Todd, Treasure, & Murphy, 2002).	**Hypotheses:** None specified.	AN according to DSM-IV (APA, 1994). Participants had a mean age of 27.7 years (SD = 7.8) and mean BMI of 14.8 (SD = 2.0).	fattening, and were asked to write the sentence "I am eating____", inserting the name of the food(s).		Schmidt, 2001); MOCI (Hodgson & Rachman, 1977), and the BDI (Beck, Rush, Shaw, & Emery, 1979).
Thought-shape fusion in eating disorders (Shafran & Robinson, 2004)	**Aims:** To examine the association between TSF and eating disorder psychopathology in patients with the full range of clinical eating disorders and to compare TSF in those with an eating disorder to those in the community with no history of an eating disorder. **Hypotheses:** None specified.	Fourty-two female participants meeting DSM-IV (APA, 1994) criteria for an eating disorder took part (10 met criteria for AN, 10 had BN, and 22 met criteria for an EDNOS). Their mean age was 28.6 years (SD = 9.7). Participants were recruited from Oxford and Hampstead. Another group of 42 females without any history of an eating disorder served as controls (mean age 28.3 years, SD = 9.1).	No, questionnaire design only,	No, questionnaire design only.	EDE-Q (Fiarburn & Beglin, 1994); Body Checking and Avoidance Questionnaire (BCAQ; Shafran, Fairburn, Robinson & Lask, 2004); BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961); and TSFQ (Shafran et al., 1999).
"Just looking at food makes me gain weight": experimental induction of thought-shape fusion in eating disordered and non-eating disordered	**Aims:** To investigate whether the experience of TSF can be induced by anxiety in general, or whether it is specific to thoughts of eating fattening foods and to compare TSF in those with clinical eating disorders and non-clinical participants. **Hypotheses:**	Thirty-five female participants with eating disorders were recruited in Toronto. Twenty-three had AN, seven had BN, and four had an EDNOS, according to DSM-IV (APA, 1994). The mean age of the clinical group	Yes. The same procedure was followed for the TSF induction as in Radomsky et al., (2002) and Shafran et al. (1999).	Yes. Participants were randomly assigned to one of three conditions: TSF induction, anxiety induction, or control induction. In the anxiety induction, participants were asked to think of a book/movie they had recently read/seen and imagine giving a speech about it, which they would be	Positive And Negative Affect Schedule (PANAS; Watson et al., 1988); TSFQ (Shafran et al., 1999); BDI-II (Beck, Steer, & Brown, 1996); TAF Scale (Shafran et al., 1996); EDE-Q (Fairburn & Beglin, 1994).

women (Coelho, Carter, McFarlane, & Polivy, 2008)	Individuals with eating disorders will exhibit higher levels of TSF than non-clinical participants. It will be possible to induce TSF in non-clinical participants without pre-selecting those high in TSF. Restrained eaters will experience more TSF than unrestrained eaters. Participants exposed to TSF induction would neutralize more and select smaller food portion sizes than those in the control induction.	was 29.10 years. Non-clinical participants included 77 undergraduate female students, classified as restrained eaters (n=38; mean age = 18.83 years) or non-restrained eaters (n=39; mean age = 18.38 years), based on a median split of scores on the Restraint Scale (Polivy, Herman, & Howard, 1988).		evaluated on the quality and how well the speech was given. Participants were asked to write the sentence "I am giving a speech about____" and insert the name of the book/movie. During the control induction, instead of giving a speech, participants were asked to imagine chatting with a friend about the book or movie and write the sentence "I am chatting about_____".	
The role of food-cue exposure and negative affect in the experience of thought-shape fusion (Coelho, Roefs, & Jansen, 2010).	**<u>Aims:</u>** To investigate three questions: 1) are chronic dieters unresponsive to TSF inductions and will they be more responsive if the induction includes visual exposure? 2) Can exposure to cues for high calorie foods induce TSF in those without an eating disorder? 3) What is the relationship between negative affect and TSF? **<u>Hypotheses:</u>** *Study 1:* Both TSF induction and mere food-cue exposure will induce higher levels of state TSF than a control condition. Using a modified TSF induction to include direct food-cue exposure will	*Study 1:* Sixty-eight female undergraduate students (mean age 20.5 years, SD = 2.6) were recruited in the Netherlands. *Study 2:* seventy-two female undergraduate participants took part (mean age 21.3 years, SD=3.4). Thirty-two were identified as restrained eaters and 40 as unrestrained eaters.	*Study 1:* During the TSF condition, a tray filled with high calorie foods was present on a table adjacent to participants, which was placed in front of participants when it was time for the induction. Participants were asked to choose one of the foods they liked and imagine they were eating large quantities of it. They were asked to write the sentence "I am eating____, inserting the name of the food, as in	*Study 1:* Yes, participants were randomly assigned to one of three conditions: control (same procedure as in Coelho et al., 2008a, with a tray of office supplies also present on a table adjacent to the participant), mere food-cue exposure (same as the control condition, however throughout the session a tray filled with high calorie foods was present on a table adjacent to participants), or TSF condition as described. *Study 2:* Participants were randomly assigned to watch one of three film clips, depending on whether they were assigned to	*Studies 1 & 2:* Participants were provided with a Dutch translation of the following questionnaires: PANAS (Watson et al., 1988); State TSFQ (adapted from Radomsky et al., 2002); Trait TSFQ (Shafran et al., 1999); Restraint Scale (Polivy, Herman, & Howard, 1988).

	lead to chronic dieters responding more than non-dieters. TSF induction and exposure to food related cues will lead to higher likelihood of participants choosing a healthy food versus unhealthy food, compared with those in a control condition. Only the TSF condition (not food-cue exposure) will lead to higher negative affect and more neutralising behaviours. *Study 2:* mood will interact with the induction, such that those in a negative mood induction will have stronger responses to the TSF induction and those exposed to a positive mood induction will have weaker responses to the TSF induction (compared to those exposed to a neutral mood induction) Those in the TSF induction will be more likely to choose a healthy food.		the studies by Shafran et al., 1999 and Radomsky et al., 2002). *Study 2:* instead of presenting a tray of food, participants were asked to imagine a high calorie food to allow them more choice over which foods they find fattening. Therefore, the original, unmodified version of TSF induction was used in study 2 (Shafran et al., 1999).	a negative mood induction, positive mood induction, or a neutral mood induction. Participants then took part in a control or TSF induction.	
Impact of functional dyspepsia on quality of life in eating disorder patients: the role of thought-shape fusion	**<u>Aims:</u>** To analyse the psychometric properties of the Nepian Dyspepsia Index (short form; NDI-SF), then investigate the quality of life and psychopathological features that underlie Functional Dyspepsia (FD) in patients with EDs, psychiatric patients	Seventy-eight patients with an eating disorder and associated functional dyspepsia (70 females; mean age 22.88 years), 77 patients with other psychiatric disorders	No, questionnaire study.	No, questionnaire design.	NDI-SF (Talley, Verlinden, & Jones, 1999), Patient Symptom Questionnaire: Visual Analogue Scales (a self-report instrument gathering information about the following symptoms: postprandial

(Jauregui Lobera, Santed, & Bolanos Rios, 2011).	without EDs and students. The analysis specifically focused on the relationship between TSF and FD, and the impact of this on quality of life. **Hypotheses:** None specified.	(anxiety, depression, and adaptive disorders) and associated functional dyspepsia (43 females; mean age 40.78 years), and 90 university students with functional dyspepsia (76 women, mean age 22.49 years). FD was diagnosed according to ROME III (Rome Foundation, 2012) criteria, whilst other disorders were diagnosed according to DSM-IV-TR (APA, 2000) criteria.			fullness, early satiation, bloating, epigastric discomfort[44], epigastric pain[45], postprandial nausea, belching after meals, and vomiting; severity of symptoms were measured on a 100mm scale (Jauregui Lobera et al., 2011b), Spanish version of the STAI (Seisdedos, 1982), Spanish version of the BDI (Conde & Franch, 1984), Spanish version of the TSFQ (Shafran et al., 1999; Jauregui Lobera et al., 2012b).
Experimental induction of thought-shape fusion in eating disorder patients: the role of coping strategies (Jauregui Lobera et al., 2011).	**Aims:** To induce TSF experimentally, to see whether TSF could be induced by anxiety in general or was specific to thoughts of fattening foods. **Hypotheses:** The specific induction of TSF will give rise to a greater effect than the experimental condition of anxiety induction. Although patients with eating	Two groups (one clinical out-patients with eating disorders, according to DSM-IV-TR (APA, 2000) and one with non-clinical students) consisted of 45 participants each (mean age 21.37 and 22.43 years for clinical and non-clinical group respectively). The clinical group consisted	Yes. The same procedure was used as that used by Shafran et al. (1999), Radomsky et al. (2002) and Coelho et al. (2008a).	Yes, 15 participants of each group were randomly assigned to one of three conditions (TSF induction, induction of anxiety, or control condition). The same procedures were used to induce each condition as in Coelho et al. (2008a). Two conditions were established for coping strategies: a) high/not high problem-focused engagement and b) high/not high emotion-focused engagement.	Visual Analogue Scale (VAS) for mood rating (0-100; 0 meaning very negative mood, 100 meaning very positive mood), State TSF was measured using a VAS, TSFQ (Shafran et al., 1999), STAI, Spanish version (STAI; Seisdedos, 1982), BDI, Spanish version (Conde & Franch, 1984), and the Coping Strategies

[44] An ache or discomfort after eating, which is poorly localised (Jauregui Lobera et al., 2011b)

[45] A sharp, easy to pinpoint pain after eating (Jauregui Lobera et al., 2011b)

	disorders should show higher TSF, it will be possible to induce TSF in non-clinical participants as well. Participants with more appropriate coping strategies will experience less TSF than those who showed inadequate coping strategies. Participants exposed to TSF induction would be more likely to neutralize and have lower food intake than those not exposed to the induction.	of 92.5% females and the non-clinical group consisted of 86.7% females. Participants were recruited in Spain.			Inventory, Spanish version (CSI; Cano Garcia, Rodriguez Franco, & Garcia Martinez, 2007).
Thought-shape fusion in bulimia nervosa: an experimental investigation (Kostopoulou, Varsou, & Stalikas, 2011).	**Aims:** To experimentally investigate TSF in patients with Bulimia Nervosa. **Hypotheses:** The experimental procedure will elicit TSF in patients with BN. TSF will increase patients' anxiety and guilt, perception of actual weight, and subjective levels of body image dissatisfaction. TSF will decrease perceptions of control over eating a 'forbidden' food, both during the experiment (direct control) and 24 hours after (indirect control). Eliciting TSF will further prompt an urge to engage in corrective behaviours aimed at cancelling out the effects of the distortion, and these behaviours will reduce the effects of the procedure.	Twenty females (mean age = 25.3 years, SD=5.56), meeting diagnostic criteria according to DSM-IV (1994) for BN took part in the study in Athens, Greece.	Following a similar procedure to Coelho et al. (2008a), participants were asked to think of a food they considered fattening and to write a sentence about it, however they were also asked to continue thinking of the food until they reached elevated anxiety and dysphoria. Other than that, the TSF induction was the same as in Coehlo et al., 2008a).	No, only TSF was induced in one sample of participants.	Participants were asked to verbally rate responses to all variables on a scale from 0 (not at all) to 100 (very high); Body Dissatisfaction Rating Scale (BDRS), which was a shorter variant of the Body Image Assessment (Williamson, Muller, Reas, & Thaw, 1989); to measure TSF, participants were asked to state if they felt fatter, if they felt they had gained weight/changed shape, and if this felt morally unacceptable to them, as well as provide ratings of these on VASs. To measure indirect control, participants were asked to estimate their

					levels of control over not eating the fattening food they imagined in 24 hours.
Cognitive distortions and eating pathology: specificity of thought-shape fusion (Coelho, Baeyens, Purdon, Pitet, & Bouvard, 2012).	**Aims:** To test the specificity of TSF by examining the effects of a TSF induction in women with eating disorders, women with OCD, and control women, and to examine the persistence of TSF-related thoughts. **Hypotheses:** Individuals with eating disorders will exhibit higher TSF, more urges to restrict, more neutralization behaviours, and higher negative affect after the induction, relative to controls. Those with eating disorders will have more difficulty dismissing food-related thoughts, and report higher concerns over failure in thought control than controls or individuals with OCD. Individuals with OCD will exhibit an increased TSF susceptibility relative to controls and will report moderate levels of difficulty in dismissing TSF-related thoughts and higher concern over failures in thought control than control women. TSF will be associated with TAF, depression, obsessional pathology, and eating pathology.	Participants included 33 females with an eating disorder (23 with AN and 10 with BN; 72% inpatient), 24 females with OCD (62.5% inpatient) (diagnoses were based on DSM-IV-TR (APA, 2000) criteria), and 26 control females with no history of an eating disorder or OCD; all were recruited in France. Mean age for the control group was 26.4 years (SD=5.7), for the OCD group was 34.5 (SD=6.3) and for the eating disorder group was 25.9 (SD=5.9).	Yes. The same procedure was used as those used in the studies by Shafran et al. (1999), Radomsky et al. (2002), and Coelho et al. (2008a).	Yes. Participants were randomly assigned to one of two conditions: TSF induction or a neutral induction, where participants were asked to think about a park and the sensory aspects of being in that situation. They were then asked to write the sentence "I am hearing____", inserting one of the sounds they imagined. All participants completed a Thought Dismissability task after the induction (participants were asked to indicate via a button press when they experienced a target thought corresponding to the situation they imagined during the induction; they were asked to replace the thought with a specific neutral thought).	State TSF Scale (adapted from Coelho et al., 2010); PANAS* (Watson, Clark, & Tellegen., 1988); Concern over Failure in Thought Control Questionnaire* (CFTQ; Purdon, 2001); Trait TSF Scale* (Shafran et al., 1999); EDE-Q* (Fairburn & Beglin, 1994); TAF Scale* (Shafran et al., 1996); Obsessive-Compulsive Thoughts Checklist (Bouvard, Mollard, Cottraux, & Guerin, 1989), and the BDI* (Beck et al., 1961). *these measures were translated into French.

Cognitive distortions in normal weight and overweight women: susceptibility to thought-shape fusion (Coelho, Jansen, & Bouvard, 2012).	**Aims:** To investigate TSF in overweight and normal weight females. **Hypotheses:** Overweight individuals will be more susceptible to TSF induction and exhibit higher TSF than normal weight females. Overweight individuals will assign a lower value to dieting behaviour after a TSF induction (relative to controls).	Sixty females who had at least a minimally normal body weight participated. Participants were classified as either normal weight (BMI between 18.5 and 24.9, M=21.5, SD=1.6, n=32), or overweight (BMI above or equal to 25, M=27.4, SD=2.2, n=28).	Yes. The procedure was the same as in Shafran et al. (1999), Radomsky et al. (2002), and Coelho et al. (2008a).	Yes, participants were randomly assigned to one of two conditions: TSF induction or control induction (both procedures were the same as used by Coelho et al. (2008a).	PANAS (Watson et al., 1988); Restraint Scale (Polivy et al., 1988); State TSF Scale (Coelho et al., 2010); Trait TSF Scale (Shafran et al., 1999); and Value of Dieting measure (Coelho, Polivy, Herman, & Pliner, 2008b).
Reactivity to thought-shape fusion in adolescents: the effects of obesity status (Coelho, Siggen, Dietre, & Bouvard, 2012).	**Aims:** To see if obese adolescents were less susceptible to TSF than those of normal weight and to investigate predictors of TSF. **Hypotheses:** Obese adolescents will be less susceptible to TSF than normal weight adolescents. Eating pathology and depression will emerge as predictors of TSF.	44 adolescents were recruited from a behaviourally based residential obesity treatment program. Their mean age was 14.3 years (SD = 1.7). Also, 38 adolescents within normal weight range were recruited from a local school. Their mean age was 12.8 years (SD = 0.9).	Yes, the procedure was the same as Shafran et al. (1999), Radomsky et al. (2002), and Coelho et al. (2008a).	Yes, participants were randomly assigned to a TSF induction or control induction. The control induction was the same as used in the study by Coelho, Baeyens, Purdon, Pitet, & Bouvard (2012).	State TSF scale (Coelho et al., 2012a); Trait TSF scale (Coelho et al., 2013); Eating Attitudes Test (EAT; Garner & Garfinkel, 1979); and Children's Depression Inventory (CDI; Kovacs & Beck, 1977, as cited in Coelho et al., 2012c).
Thought-shape fusion and body image in eating disorders (Jauregui-Lobera, Bolanos-Rios, & Ruiz-Prieto, 2012).	**Aims:** To analyse the relationships amongst TSF, body image disturbances, and body image quality of life in patients with eating disorders, to improve understanding of the links between body image concerns and TSF. **Hypotheses:**	Seventy-six participants (69 females) with an eating disorder, according to DSM-IV-TR (APA, 2000) criteria took part. Their mean age was 20.13 years (SD=2.28). The study was carried out	No, it was a questionnaire study.	No, it was a questionnaire study.	TSFQ (Shafran et al., 1999), Spanish versions of the following were also used: Body Image Quality of Life Inventory (BIQLI; Cash & Fleming, 2002), the Body Appreciation Scale (BAS; Avalos, Tylka, & Wood-Barcalow, 2005), the Body

	Considering the transdiagnostic theory of eating disorders, differences between subgroups of eating disorders with respect to variables included in the study would not be expected. There will be differences in the variables between patients with high versus low TSF. There will be significant correlations between TSF and body image-related variables that would be maintained after controlling for psychopathological variables.	in Spain. Thirty participants had AN, 19 had BN, and 17 had an EDNOS.			Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987), Eating Disorder Inventory (EDI-2; Garner, 1998), Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1983).) and the STAI (Seisdedos, 1982).
Psychometric properties of the Spanish version of the thought-shape fusion questionnaire (Jauregui Lobera, Santed, Shafran, Santiago, & Estebanez, 2012).	**Aims:** To analyse the psychometric properties, factor structure, and internal consistency of the Spanish version of the TSFQ, as well as determine its validity by evaluating the relationship of the TSFQ to different instruments **Hypotheses:** None specified.	One hundred and forty-six patients (128 females) with a diagnosis (according to DSM-IV-TR; APA, 2002) of AN (n=82), BN(n=33), or EDNOS (n=31) took part. This group had a mean age of 23.25 years (SD-8.79). All were treated as outpatients in Spain. One hundred and fifteen undergraduate participants from Spanish universities also took part, none had history of a	No, validation of a questionnaire study	No, validation of a questionnaire study	Spanish versions of the following were used: TSFQ (Shafran et al., 1999) (English version and Spanish version); the Thought-Action Fusion Questionnaire (Jauregui Lobera et al., 2012); Eating Disorders Inventory-2 (EDI-2; Garner, 1998); the STAI (Seisdedos, 1982); the BDI (Conde & Franch, 1984); and the SCL-90-R (Derogatis, 1983).

		psychological disorder (97 females). They had a mean age of 28.69 years (SD=11.19).			
Assessment of thought–shape fusion: initial validation of a short version of the trait thought–shape fusion scale (Coelho et al., 2013).	**Aims:** *Study 1:* To explore the psychometric properties of a French short version of the TSFQ. *Study 2*: To see if other factors such as eating pathology and obsessionality predict TSF. **Hypotheses**: Obsessionality, thought suppression, TAF, and depression will be associated with TSF. Body dissatisfaction, eating pathology, obsessionality, TAF, and depression will predict TSF.	*Study 1*: Two hundred and eighty-four female undergraduate students with no history of an eating disorder (mean age = 20.5 years, SD = 4.8). *Study 2:* Twenty-two females with an eating disorder (17 with AN (excluding amenorrhea criteria) and 5 with BN, according to DSM-IV – TR (APA, 2000) criteria) and 23 female controls (with no history of an eating disorder or OCD). Mean age for this group was not reported.	*Study 1:* No, validation of a questionnaire study. *Study 2*: No, questionnaire study only.	No, they were questionnaire studies.	French versions of the following were used: TSFQ (Shafran et al., 1999); BSQ (Cooper et al., 1987); EDE-Q (Fairburn & Beglin, 1994); TAF Scale (Shafran et al., 1996), Obsessive Beliefs Questionnaire (OBQ; OCCWG, 2005); White Bear Suppression Inventory (WBSI; Wegner & Zanagos, 1994); The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977).; Trait TSF Scale (Coelho et al., 2013).

Appendix B. ROME III criteria for Functional Dyspepsia (Rome Foundation, 2012)

Functional Gastroduodenal Disorders

FUNCTIONAL DYSPEPSIA

Diagnostic criteria Must include:*
One or more of the following:
a. Bothersome postprandial fullness
b. Early satiation
c. Epigastric pain
d. Epigastric burning
AND
No evidence of structural disease (including at upper endoscopy) that is likely to explain the symptoms
* Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

ABDOMINAL PAIN-RELATED FUNCTIONAL GASTROINTESTINAL DISORDERS

Functional Dyspepsia
Diagnostic criteria Must include **all** of the following:*

- Persistent or recurrent pain or discomfort centered in the upper abdomen (above the umbilicus)
- Not relieved by defecation or associated with the onset of a change in stool frequency or stool form (i.e., not irritable bowel syndrome)
- No evidence of an inflammatory, anatomic, metabolic or neoplastic process that explains the subject's symptoms

* Criteria fulfilled at least once per week for at least 2 months prior to diagnosis

Appendix C. DSM-IV-TR (APA, 2000) criteria for Anorexia Nervosa, Bulimia Nervosa, and Binge-Eating Disorder.

Anorexia Nervosa.

A. Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g. weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
B. Intense fear of gaining weight or becoming fat, even though underweight.
C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
D. In postmenarcheal females, amenorrhea, i.e. the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g. estrogen, administration.).

Specify type:

Restricting Type: during the current episode of Anorexia Nervosa, the person has not regularly engaged in binge-eating or purging behaviour (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

Binge-Eating/Purging Type: during the current episode of Anorexia Nervosa, the person has regularly engaged in bing-eating or purging behaviour (i.e. self-induced vomiting or the misuse of laxatives, diuretics, or enemas).

Bulimia Nervosa.

A. Recurrent episodes of binge-eating. An episode of binge-eating is characterized by both of the following:
   (1) eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.
   (2) a sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating).
B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, enemas, or other medications; fasting, or excessive exercise.
C. The binge-eating and inappropriate compensatory behaviours both occur, on average at least twice a week for 3 months.
D. Self-evaluation is unduly influenced by body shape and weight
E. The disturbance does not occur exclusively during episodes of Anorexia Nervosa

Specify type:

Purging Type: during the current episode of Bulimia Nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas.

Nonpurging Type: during the current episode of Bulimia Nervosa, the person has used other inappropriate compensatory behaviours, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the

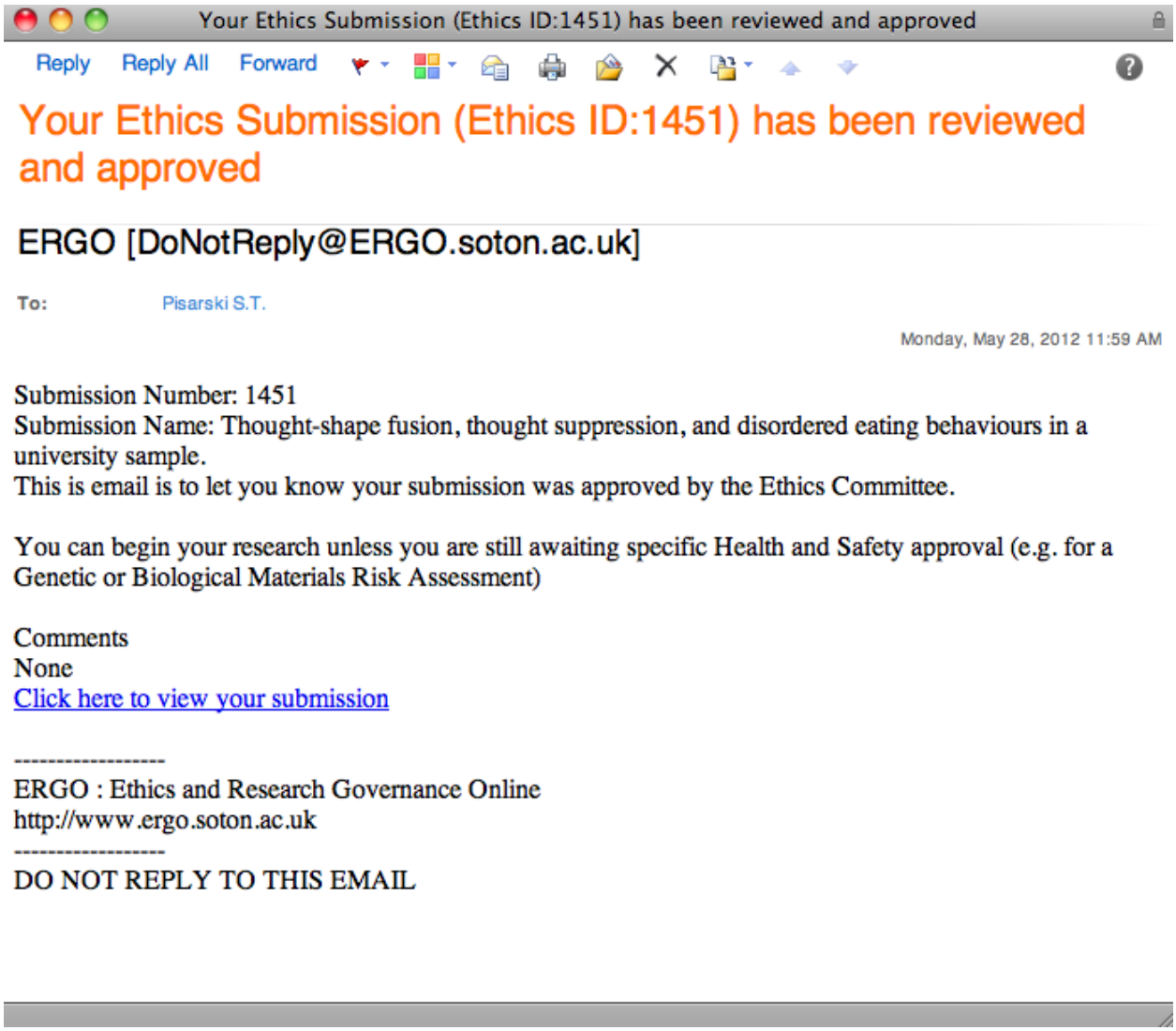
misuse of laxatives, diuretics, or enemas.

Eating Disorder Not Otherwise Specified.

The eating disorder not otherwise specified category is for disorders of eating that do not meet the criteria for specific Eating Disorder. Example include:

1. For females, all of the criteria for Anorexia Nervosa are met except that the individual has regular menses.
2. All of the criteria for Anorexia Nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range.
3. All of the criteria for Bulimia Nervosa are met except that the binge eating and inappropriate compensatory mechanisms occur at a frequency less than twice a week or for a duration less than three months.
4. The regular use of inappropriate compensatory behaviour by an individual of normal body weight after eating small amounts of food (e.g. self-induced vomiting after the consumption of two cookies.
5. Repeatedly chewing and spitting out, but not swallowing, large amounts of food.
6. Binge-eating disorder: recurrent episodes of binge-eating in the absence of the regular use of inappropriate compensatory behaviours characteristic of Bulimia Nervosa.

Appendix D. Confirmation of ethical approval.



Your Ethics Submission (Ethics ID:1451) has been reviewed and approved

Reply Reply All Forward

Your Ethics Submission (Ethics ID:1451) has been reviewed and approved

ERGO [DoNotReply@ERGO.soton.ac.uk]

To: Pisarski S.T.

Monday, May 28, 2012 11:59 AM

Submission Number: 1451
Submission Name: Thought-shape fusion, thought suppression, and disordered eating behaviours in a university sample.
This is email is to let you know your submission was approved by the Ethics Committee.

You can begin your research unless you are still awaiting specific Health and Safety approval (e.g. for a Genetic or Biological Materials Risk Assessment)

Comments
None
Click here to view your submission

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Appendix E. Table detailing questions on disordered eating behaviours used in analyses.

Questionnaire	Question or subscale used in analyses	Reason for inclusion
EDE-Q (Fairburn & Beglin, 1994)	13. Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?	These questions measure the frequency of some disordered eating behaviours, which enables one to determine the extent to which they are carried out and to see whether TSF and/or thought suppression significantly relate to them.
	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)?	
	Over the past 28 days, on how many **DAYS** have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?	
	Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?	
	Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?	
	Over the past 28 days, how many times 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?	

	Restraint subscale	This question measures dietary restraint (i.e. the tendency to restrict food intake and avoid meals/high-calorie foods) as well as attempts to obey rigid rules for dieting (e.g. "Have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape or weight?"; Racine, Burt, Iacono, McGue, & Klump, 2011). Strict dieting is thought to be a key maintaining factor in EDs (Fairburn et al., 2003).
	Global EDE-Q score	This was an assessment of overall ED psychopathology (Rush et al., 2000), which includes both disordered eating behaviours and cognitions.
TFEQ-R18 (Karlsson et al., 2000)	Cognitive Restraint subscale	This subscale assessed conscious restriction of food intake to control body weight/shape or promote weight loss; HRQL group, 2000). Similar to the restraint subscale of the EDE-Q, this subscale was used as strict dieting is thought to be a key maintaining factor in EDs (Fairburn et al, 2003).
	Uncontrolled Eating subscale	This subscale assessed the tendency to lose control over eating, for example when hungry or when exposed to external stimuli (HRQL group, 2000). This was used in the analyses, as loss of control over eating is a necessary

		component of bulimic and binge-eating episodes (APA, 2000).
	Emotional Eating subscale	This subscale measured a tendency to overeat in relation to negative mood states (HRQL group, 2000), which is a common feature amongst those with an eating disorder (Fairburn, 2008).

Appendix F. Poster used to advertise study.

Study Investigating Meta-Cognitive Beliefs and Eating Behaviours – 2 Credits!!

Dear reader…..

Are you female and aged between 18 and 65??

If so, I would very much appreciate your participation in a study I am running. It aims to investigate how people respond to their thoughts and the impact this might have on self-reported eating behaviours.

The study will involve completing five questionnaires regarding different eating behaviours you might carry out, different experiences you might encounter regarding your thoughts, and how you might respond to your thoughts. The questionnaires are provided online and are estimated to take around 30-40 minutes to complete.

If you would like to find out more about taking part, please visit https://www.isurvey.soton.ac.uk/5183 or select the study "meta-cognitive beliefs and eating behaviours" on Psychobook to earn 2 research credits!

Many thanks!

Stephanie Pisarski
Trainee Clinical Psychologist at the University of Southampton (stp106@soton.ac.uk).

Appendix G. Information and consent form.

Study investigating meta-cognitive beliefs and eating behaviours

You are being invited to take part in a research study. Before you decide whether or not you would like to take part it is important for you to understand the purpose of the research and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. Please ask the principal investigator if there is anything that is not clear or if you would like more information.

What is the purpose of the study? The aim of the study is to investigate how people respond to their thoughts and the impact this might have on self-reported eating behaviours. We are hoping that the results will help researchers and clinicians work towards understanding some of the processes that contribute to different behaviours associated with eating. The study will start in May 2012 and will run until October 2013.

What will the study involve? If you decide to take part, you will be asked to complete five questionnaires regarding different eating behaviours you might carry out, different experiences you might encounter regarding your thoughts, and how you might respond to your thoughts. The questionnaires are estimated to take around 30-40 minutes to complete.

Why have I been invited? You have been invited to take part because you are female and aged between 18 and 65.

If you take part in the study you are free to withdraw at any time, you can just close the page on your browser. If you wish to withdraw your data once you have clicked 'save' please e-mail me at the address below. Please note that once the study is complete and the final report has been written, you will no longer be able to withdraw your data from the study.

What are the possible benefits of taking part? It is unlikely that you will experience any immediate benefits from taking part; however we hope that the study will help individuals in the future to manage difficult thoughts and eating behaviours.

Are there any possible disadvantages of taking part? There are no significant risks from taking part in this study, however it is possible you may find some of the questions distressing. If this should happen you can withdraw from the study at any time, seek advice from your GP, or visit the Beating Eating Disorders website (BEAT) at www.b-eat.co.uk. You can also contact the principal investigator at the email address below.

Will my responses be kept confidential? If you decide to take part in the study, any responses to questionnaires will be kept strictly confidential and any data stored will be password-protected.

What will happen to the results of the study? The results will be written in a report for a Doctorate in Clinical Psychology thesis, which will be assessed by the University of Southampton. Results may also be submitted for publication within the next 2 years. You will not be personally identified in any reports or literature and you will be able to obtain a copy of any publications by contacting the principal investigator.

By ticking the box below you are consenting to the following conditions:

I confirm that I have read and understood the information for the above study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without penalty or loss of benefit to myself.

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Principal investigator: Stephanie Pisarski, Trainee Clinical Psychologist, email: stp106@soton.ac.uk.

Ethics reference number: 1451

Thank you for reading this.

☐ Please tick (check) this box to indicate that you consent to taking part in this survey

Click here to start this survey

Appendix H. Questionnaires used in the study.

Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994).

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 trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?							
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?							
3 Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?							
4 Have you tried 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)?							
5 Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?							
6 Have you had a definite desire to have a totally flat stomach?							
7 Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?							
8 Has thinking about shape or weight made it very difficult to							

concentrate on things you are interested in (for example, working, following a conversation, or reading)?							
9 Have you had a definite fear of losing control over eating?							
10 Have you had a definite fear that you might gain weight?							
11 Have you felt fat?							
12 Have you had a strong desire to lose weight?							
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 times have you eaten what other people would regard as an unusually large amount of food (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 **DAYS** have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)? **.....**							
16 Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight? **.....**							
17 Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight? **.....**							
18 Over the past 28 days, how many times 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**		**Moderately**		**Markedly**
22 Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23 Has your shape 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 weight?	0	1	2	3	4	5	6
26 How dissatisfied have you been with your shape?	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 others 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 age? ..... years
What is your weight at present? (Please give your best estimate.).....
What is your height? (Please give your best estimate.).....
Are you male/female? .....
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

Three Factor Eating Questionnaire (Revised-18; De Louzon et al., 2000)

		Definitely true	*Mostly true*	*Mostly false*	*Definitely false*
1.	When I see a real delicacy, I often get so hungry that I have to eat right away.	1☐	2☐	3☐	4☐
2.	I deliberately take small helpings as a means of controlling my weight.	1☐	2☐	3☐	4☐
3.	When I feel anxious, I find myself eating.	1☐	2☐	3☐	4☐
4.	Sometimes when I start eating, I just can't seem to stop.	1☐	2☐	3☐	4☐
5.	Being with someone who is eating often makes me hungry enough to eat also.	1☐	2☐	3☐	4☐
6.	When I feel blue, I often overeat.	1☐	2☐	3☐	4☐
7.	When I smell a sizzling steak or a juicy piece of meal, I find it very difficult to keep from eating, even if I have just finished a meal.	1☐	2☐	3☐	4☐
8.	I get so hungry that my stomach often seems like a bottomless pit.	1☐	2☐	3☐	4☐
9.	I am always hungry so it is hard for me to stop eating before I finish the food on my plate.	1☐	2☐	3☐	4☐
10.	When I feel lonely, I console myself by eating.	1☐	2☐	3☐	4☐
11.	I consciously hold back at meals in order not to gain weight.	1☐	2☐	3☐	4☐
12.	I do not eat some foods because they make me fat.	1☐	2☐	3☐	4☐
13.	I am always hungry enough to eat at any time.	1☐	2☐	3☐	4☐

Thought-Shape Fusion Questionnaire (Shafran et al., 1999).

Please rate each statement by putting a circle around the number that best describes how much you agree with the statement, or how much it is true of you. Even though some of your responses may seem irrational to you, we want to know what you think on an emotional level.
Please answer every item without spending too much time on any particular item.

How much do you agree with the following statements?	**Not at all**	**Some**	**Much**	**Very much**	**Totally**
1. Thinking about eating chocolate is almost as unacceptable to me as actually eating chocolate	0	1	2	3	4
2. I feel fatter after thinking about eating chocolate.	0	1	2	3	4
3. If I think about gaining weight, I want to check that my clothes aren't fitting more tightly.	0	1	2	3	4
4. Thinking about gaining weight is almost as immoral to me as actually gaining weight.	0	1	2	3	4
5. Just picturing myself gaining weight can really make me gain weight.	0	1	2	3	4
6. I feel huge if I just imagine not exercising for a month.	0	1	2	3	4
7. Just thinking about "pigging-out" makes me want to weigh myself.	0	1	2	3	4
8. Just imagining myself "pigging-out" can actually make me look fatter.	0	1	2	3	4
9. Thinking about breaking my diet makes me want to check in the mirror that I don't look any fatter.	0	1	2	3	4
10. Just thinking about not exercising can change the way I really look.	0	1	2	3	4
11. I feel fatter if I just think about "pigging-out".	0	1	2	3	4
12. Just thinking about not exercising for a month makes me want to cut down on what I eat.	0	1	2	3	4
13. If I think about breaking my diet, it is almost as unacceptable as really breaking my diet.	0	1	2	3	4
14. My shape can actually change, just by me planning to eat fattening food.	0	1	2	3	4
15. My body feels enormous when I just picture myself breaking my diet.	0	1	2	3	4
16. I feel fatter just by thinking about gaining weight.	0	1	2	3	4
17. Picturing myself eating chocolate makes me want to check my body to make sure I haven't gained any weight.	0	1	2	3	4

How much do you <u>agree</u> with the following statements? **THE FACT THAT I THINK ABOUT EATING 'FORBIDDEN' OR 'FATTENING' FOOD MEANS…..**	**Not at all**	**Some**	**Much**	**Very much**	**Totally**
18. … I am a pig	0	1	2	3	4
19. …That I'm going to gain weight	0	1	2	3	4
20. … I'm out of control	0	1	2	3	4
21. … I'm a greedy person	0	1	2	3	4
22. … I'm going to lose control and eat the food	0	1	2	3	4
23. … I'm a loser	0	1	2	3	4
24. …I'm worthless	0	1	2	3	4
25. … I am NOT going to eat the food	0	1	2	3	4
26. … I can't control my mind	0	1	2	3	4
27. … I'm a bad person	0	1	2	3	4
28. … I'm weak willed	0	1	2	3	4
29. …That I've lost control of myself	0	1	2	3	4
30. … I'm not perfect	0	1	2	3	4
31. …That I need to restrict my eating more	0	1	2	3	4
32. …I'm stupid	0	1	2	3	4
33. …That I'm going to get fat	0	1	2	3	4
34. … I lack self-discipline	0	1	2	3	4
35. Other (please specify)	0	1	2	3	4
36. Other (please specify)	0	1	2	3	4

White Bear Suppression Inventory (Wegner & Zanakos, 1994).

WBSI

This survey is about thoughts. There are no right or wrong answers, so please respond honestly to each of the items below. Be sure to answer every item by circling the appropriate letter beside each.

A	B	C	D	E
Strongly Disagree	Disagree	Neutral or Don't Know	Agree	Strongly Agree

A B C D E 1. There are things I prefer not to think about.

A B C D E 2. Sometimes I wonder why I have the thoughts I do.

A B C D E 3. I have thoughts that I cannot stop.

A B C D E 4. There are images that come to mind that I cannot erase.

A B C D E 5. My thoughts frequently return to one idea.

A B C D E 6. I wish I could stop thinking of certain things.

A B C D E 7. Sometimes my mind races so fast I wish I could stop it.

A B C D E 8. I always try to put problems out of mind.

A B C D E 9. There are thoughts that keep jumping into my head.

A B C D E 10. There are things that I try not to think about.

A B C D E 11. Sometimes I really wish I could stop thinking.

A B C D E 12. I often do things to distract myself from my thoughts.

A B C D E 13. I have thoughts that I try to avoid.

A B C D E 14. There are many thoughts that I have that I don't tell anyone.

A B C D E 15. Sometimes I stay busy just to keep thoughts from intruding on my mind.

Appendix I. Debriefing form.

Study investigating meta-cognitive beliefs and eating behaviours

The aim of this research is to find out whether or not people who believe thinking about food will lead to negative consequences are more likely to experience more difficult eating behaviours. The study also aims to find out if people who react to these beliefs by attempting to suppress their thoughts are also more likely to experience more difficult eating behaviours. We hope this research will help us to work towards developing more appropriate treatments in the future for people with problematic eating patterns and eating disorders. Once again, all of the information you have provided will remain confidential. This study did not use deception.

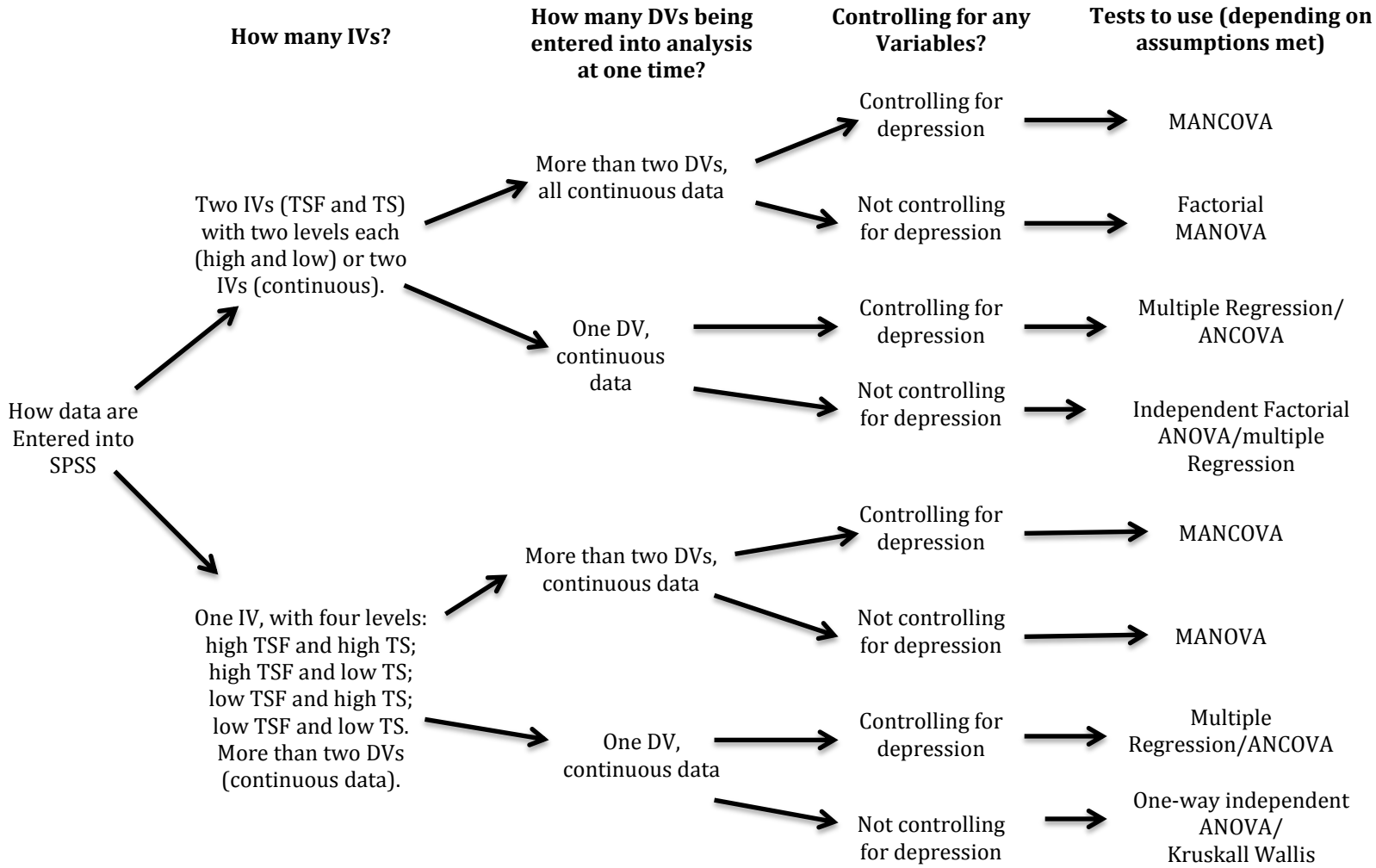
If you would like a summary of the findings of the study please email me at stp106@soton.ac.uk and I will send this to you once I have completed the analysis. If you have any further questions please contact me by email.

If you have any concerns regarding eating behaviours you can contact your GP for advice or visit the Beating Eating Disorders Website (BEAT) at www.b-eat.co.uk. If you feel upset as a consequence of taking part in the study, please do not hesitate to contact me using the details above.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: +44 (0)23 8059 4663, email slb1n10@soton.ac.uk

Thank you very much for your participation in this research.

Appendix J. Decision tree for statistical test to use



Appendix K. Pros and cons of each statistics option.

Step in Flow Diagram	Options	Pros	Cons
How to enter independent variables (IVs) into SPSS	Two IVs with two levels (categorical)	• Can investigate interactions. • Can look at the individual effect of TSF and thought suppression (TS) on outcome variables. • Categorical data may be easier to interpret than continuous data with regard to hypotheses.	• Although plots and means will inform the person analyzing the data whether those with high TSF and high TS exhibit more disordered eating behaviours than those with high TSF and low TS, low TSF and high TS and low TSF and low TS, follow up analyses will be needed to look where significant differences are. It may not be possible to explore all differences between groups due to the analyses that are available. • Will need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group will be in the same category as those at the higher end of the high TSF group, meaning variations may not be considered in enough depth. Continuous data would consider these variations more.
	Two IVs (continuous)	• Less people will be excluded than with two IVs and two levels as there would be less need to exclude people that fall into two categories. • Can look at more of the variance in the whole sample, rather than looking at variance within groups.	• Data may be more difficult to interpret alone in terms of hypotheses

	One IV with four levels (categorical)	• Can look at differences in outcomes with both TSF and TS together, rather than TSF or TS alone. • Clearer to interpret outcome data with regard to hypotheses.	• Cannot look at interactions. • May need to exclude people that fall into more than one category. • More difficult to look at the effect of TSF and TS separately on outcome variables. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more.
How to Enter dependent variables (DVs) into SPSS	One DV at a time.	• Output will be more transparent. • Can choose to do parametric or non-parametric data analysis at each comparison depending on distribution of data.	• More chance of familywise/experimentwise[46] error. • More time-consuming • Cannot look at the relationship between DVs (which can be done with a MANOVA).
	All DVs together.	• Less chance of familywise/experimentwise error than if looking at each output variable separately. • Quicker to run a MANOVA than lots of ANOVAs, for example. • Can look at the relationship between DVs.	• Unable to choose parametric or non-parametric data analysis for each comparison if data are not normally distributed for all data. This may make the analysis less reliable. • Need to have good theoretical basis to put all DVs into a MANOVA/MANCOVA together (otherwise one may reach conclusions that are not empirically meaningful even though they may show statistical differences; Field, 2009), so may still need to run more than one test.
Whether or not to	Controlling for depression.	• When looking at the data there was a significant correlation between depression	• Any non-significant findings may be due to depression playing an important role in TSF and TS.

[46] According to Field (2009) familywise (also known as experimentwise) error is an inflated probability of type I error (falsely rejecting the null hypothesis) due to conducting lots of tests with one dependent variable rather than one test with lots of dependent variables.

Control for depression.		and the outcome variables, meaning depression is likely to account for some of the variance in outcome data if not controlled for in the analyses. • May be able to say with more certainty that any significant differences are more likely to be due to TSF and TS than depression.	
	Not Controlling for depression.	• There was a positive correlation between depression and the independent variables, which means controlling for it may mean losing an important element of TSF and TS.	• Any significant findings may be more so due to depressive symptoms than TSF or TS, which may have important clinical implications.
Specific Statistical test	MANCOVA	• Can look at an interaction between variables if do a 2x2 MANCOVA. • Can look at the effect of TSF and TS separately on outcome variables if do a 2x2 MANCOVA • Can control for depression so may be able to say with more certainty that any significant differences are more likely to be due to TSF and TS than depression. • Categorical data may be easier to interpret in relation to hypotheses. • Fairly robust to violations of normal distribution of data. • Less chance of familywise/experimentwise error than looking at each output variable separately. • Quicker to run a MANOVA than lots of ANOVAs. • Can look at the relationship between DVs.	• May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more. • Unable to choose parametric or non-parametric data analysis for each comparison if data are not normally distributed for all data. This may make the analysis less reliable. • Need to have good theoretical basis to put all DVs into a MANCOVA together, so may need to run more than one test. • There was a positive correlation between depression and the independent variables, which means controlling for it may mean losing an important element of TSF and TS; thus, any non-significant findings may be due to depression playing an important role in TSF and TS. • MANCOVAs do not provide any information on

		predictive variance.
MANOVA/ Factorial (2x2) MANOVA	• Can look at interactions between variables • Can look at the effect of TSF and TS separately on outcome variables. • Categorical data may be easier to interpret in relation to hypotheses. • Fairly robust to violations of normal distribution of data. • Less chance of familywise/experimentwise error than looking at each output variable separately. • Quicker to run than lots of ANOVAs • Can look at the relationship between DVs. • There was a positive correlation between depression and the IVs, which means not controlling for depression may mean an important element of TSF and TS may not have been lost.	• Cannot control for depression if it needs to be controlled for. Therefore, any significant findings may be more so due to depressive symptoms than TSF or TS, which may have important clinical implications. • Not as easy to look at contrasts as it is with a one-way ANOVA or multiple regression. • May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more. • Unable to choose parametric or non-parametric data analysis for each comparison if all data are not normally distributed but some is. This may make the analysis less reliable. • Need to have good theoretical basis to put all DVs into a MANOVA together, so may need to run more than one test. • MANOVAs do not provide information about predictive variance.
ANCOVA	• Can look at interactions between variables with a 2x2 ANCOVA. • Can control for depression. • Categorical data may be easier to interpret in relation to hypotheses than continuous data. • Output will be more transparent than output from a MANCOVA. • Can choose to do parametric or non-	• May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more. • More chance of familywise/experimentwise error than with a MANCOVA.

	parametric data analysis at each comparison depending on distribution of data. • Fairly robust to violations of normal distribution of data. • May be able to say with more certainty that any significant differences are more likely to be due to TSF and TS than depression.	• More time consuming than a MANCOVA • Cannot look at the relationship between DVs. • controlling for depression may mean losing an important element of TSF and TS. • Does not provide any information about predictive variance.
Independent Factorial (2x2) ANOVA	• Can look at interactions between variables. • Can look at the effect of TSF and TS separately on outcome variables. • Categorical data may be easier to interpret in relation to hypotheses. • Output will be more transparent than MANOVA • Can choose to do parametric or non-parametric data analysis at each comparison depending on distribution of data. • Fairly robust to violations of normal distribution of data. • The positive correlation between depression and the independent variables means not controlling for depression may mean not losing an important element of TSF and TS.	• Cannot control for depression, meaning any significant findings may be more so due to depressive symptoms than TSF or TS, which may have important clinical implications. • May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more. • More chance of familywise/experimentwise error than with MANOVAs. • More time consuming than MANOVAs. • Cannot look at the relationship between DVs. • Does not provide any information about predictive variance.
One-way Independent ANOVA	• Categorical data may be easier to interpret in relation to hypotheses than continuous data. • Easier to look at contrasts than with a ANOVA/MANOVA. • Can look at differences in outcomes with both TSF and TS, to see if they impact on outcomes together.	• Cannot control for depression, meaning any significant findings may be more so due to depressive symptoms. • May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data

	• Output will be more transparent than MANOVA. • Can choose to do parametric or non-parametric data analysis at each comparison depending on distribution of data. • Fairly robust to violations of normal distribution of data. • The positive correlation between depression and the independent variables means not controlling for depression may mean not losing an important element of TSF and TS.	would consider these variations more. • Cannot look at interactions. • More difficult to look at the effect of TSF and TS separately on outcome variables. • Does not provide any information about predictive variance.
Kruskall-Wallis Test	• Categorical data may be easier to interpret in relation to hypotheses than continuous data. • Output will be more transparent than MANOVA and is more suited to non-parametric data. • Can use the test only on the comparisons that are non-parametric and can use parametric tests where necessary; this would not be possible with a MANOVA. • The positive correlation between depression and the independent variables means not controlling for depression may mean not losing an important element of TSF and TS.	• Cannot control for depression, meaning any significant findings may be more so due to depressive symptoms than TSF or TS, which may have important clinical implications. • May need to exclude people that fall into two categories. • Separating the data into categories using a median split means that those at the lower end of the high TSF group would be in the same category as those at the higher end of the high TSF group. Continuous data would consider these variations more. • More chance of familywise/experimentwise error. • More time-consuming. • Cannot look at the relationship between DVs. • Does not provide any information about predictive variance
Multiple Regression	• Easier to look at contrasts than with some of the other tests. • Will not need to exclude people that fall into the same category as analysis is carried out	• Hypotheses set at the beginning of data collection relate to looking at differences between groups in outcome variables rather than predictability, to see whether more extensive research would be warranted

	on the whole continuous data set rather than categorical data. • Can look at more of the variance in the whole sample, rather than looking at variance between groups. • Fairly robust to violations of normal distribution of data. • Can control for depression, meaning one may be able to say with more certainty that any significant differences are more likely to be due to TSF and TS than depression. • Can also not control for depression, which means due to the positive correlation between depression and the independent variables, an important element of TSF and TS may not be lost. • Looks at predicted variance so will offer more information with regard to whether TSF and TS predict outcomes rather than just showing differences between groups.	in this area in a clinical sample. • There are some outliers within th data set but no logical reason to exclude them. This may make regression unreliable (Field, 2009).

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