



Think fat, feel fat: Can Thought-Shape Fusion (TSF) cause increased body dissatisfaction in a laboratory setting?

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**ABSTRACT**

Thought-shape fusion (TSF) is a cognitive distortion which has been found to be associated with various degrees of eating pathology. It is the phenomenon that merely thinking about eating a fattening food evokes increased feelings of guilt, moral wrong-doing and perceptual weight gain. Previous research has shown that TSF can be experimentally induced in both clinical and non-clinical samples. To date, there have been no previous studies that have looked at body dissatisfaction in relation to TSF despite some studies showing that food-cue exposure can influence body dissatisfaction. The aims of the present study were to directly assess the relationship between TSF and level of dietary restraint in females in the North East of England (n=62) and to establish whether inducing TSF experimentally could bring about an increase in body dissatisfaction in those individuals with high levels of dietary restraint, using a 2 x 2 x 2 mixed design. It was predicted that there would be a positive association between TSF and level of dietary restraint and that experimentally induced TSF would result in an increase in body dissatisfaction in individuals with high dietary restraint but not those with low dietary restraint. As predicted, results indicated that high dietary restraint was associated with high levels of TSF. Furthermore, a significant increase in body dissatisfaction occurred following the TSF induction in the high dietary restraint group but no significant change was observed in the low dietary restraint group. Findings are discussed in relation to previous research findings and the possibilities of adapting this technique for therapeutic intervention are considered.

<b>Key words:</b>	<b>Thought shape-fusion</b>	<b>Body dissatisfaction</b>	<b>Dietary restraint</b>	<b>Experimental induction</b>	<b>Perceptual weight gain</b>
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## Introduction

Cognitive distortions are a fundamental component in explaining how and why individuals experience problems in their cognitive functioning and thinking. The theory of cognitive distortions was first proposed by Beck (Beck Robert & Aaron, 1988) and popularised by Burns e.g. (Burns, 1980); the concept of which is the main principle behind cognitive behavioural therapy (CBT). Research suggests that cognitive distortions are brought about by errors in an individual's thinking or brain functioning; if a person thinks something often enough, they will begin to believe it (Mann & Beech, 2003). Given that this can create biased interpretations and errors in logic, this change or distortion in one's thinking can further impact how a person feels about themselves and certain experiences.

Burns, (1980) has identified as many as ten different cognitive distortions related to irrational thoughts and negative thinking. Such distortions include: filtering, emotional reasoning, over-generalisation and personalisation (Burns, 1980). Leading theorists have provided literature supporting Beck's theory of cognitive distortions by outlining a relationship between errors in thinking and cognitive distortions (Leahy, 2003).

Different theoretical perspectives have questioned the idea of cognitive dysfunctions. Research by Gilbert (1998) proposed that cognitive distortions are natural consequences of defence algorithms that are sensitive to threat. It could therefore be argued that humans have evolved to think adaptively not logically, implying that cognitive distortions are not necessarily errors in brain functioning (Gilbert, 1998). In support for Gilbert's (1998) findings, research proclaimed that there is a lack of definitional clarity for cognitive distortions. Theorists have argued that the label 'cognitive distortions' has become too broad by grouping different phenomena together such as: "attitudes, cognitive products and post-hoc excuses" (Maruna & Mann, 2006). This suggests that cognitive distortions are used to explain other occurrences related to cognition, not just errors in thinking. However, recent research has proposed that cognitive distortions can be classified into either of the following groups; general or specific (Francheschi, 2010). This theory contradicts the findings from Maruna's (2006) study and supports the notion that there are different types of cognitive distortions that people experience.

The processes underpinning cognitive distortions have been of interest to cognitive theorists over that last few decades. Research has found that psychiatric and a variety of emotional disorders have been characterised by cognitive distortions (Brewin, 1989; Shafran & Robinson, 2004), including depression, anxiety and stress. Evidence supporting this found that children suffering from depression exhibited a distorted style of processing in terms of self-evaluative information (Kendall, Stark, & Adam, 1990). Theorists have explained that cognitive distortions play a role in perpetuating these disorders, if they have the following criteria: "the distortion is

associated with the psychopathology of the disorder; experimental manipulation results in the predicted effect on psychopathology; and the decrease/elimination of the distortion causes a reduction or possible eradication of the abnormal behaviour or experience” (Shafran, Teachman, Kerry, & Rachman, 1999). Some distortions have been widely researched over others; depression (Beck Robert & Aaron, 1988); obsessive compulsive disorder (Salkovskis, et al., 2000) and maladaptive beliefs in sex offenders (Ward, Hudson, & Johnston William, 1997). However, more investigation is needed into other areas to enhance our understanding of how they work and their relationship with other disorders.

Recently numerous studies have explored the idea that cognitive distortions may be associated with eating disorders and body image (Myers & Biocca, 1992); this may be a product of the increased interest in body image perception, distortion and satisfaction over the last 20 years (Polivy, Herman, & Pliner, 1990). Research has found that eating pathology is similar to other psychological disorders in that it may be “predisposed, precipitated, and perpetuated by cognitive biases” (Lee & Shafran, 2004). According to Fairburn, Cooper and Shafran (2003) cognitive distortions are the basis for the onset of an eating disorder. The importance of this role highlights how cognitive distortions may also maintain the disorder due to certain features involved with eating disorders: obsessive thoughts, inaccurate judgments and rigid thinking patterns (Polivy & Herman, 2002). It has been argued that body satisfaction and self esteem in eating disordered individuals stems from ‘strong and rigid beliefs’ about food and weight control (M. J. Cooper, Anastasiades, & Fairburn, 1992). This obsessive control is centred on their dislike for their shape and size. Although this concept is founded on thorough evidence, it is difficult to determine causality due to the nature of the subject matter. Do individuals develop eating disorders through distorted cognitive processes or are cognitive distortions a result of an eating disorder? This is yet to be concluded however, theoretical research has established that there is a definite relationship between cognitive distortions and eating pathology (M. Cooper, 1997; Polivy & Herman, 2002; Vitousek, 1996). Studies that support this belief found that cognitive distortions were more common in individuals with an eating disorder as weight and body image are central elements in their self-esteem (Lee & Shafran, 2004).

In line with previous literature discussed, research supports the idea that eating disordered individuals might be more concerned with their weight, shape and size due to certain features in their thinking. Evidence has suggested that these individuals believe that people will think better of them if they are thin (Jakatdar, Cash, & Engle, 2006). This may aid in explaining why eating disordered individuals are more prone to cognitive distortions; because they are more concerned by their weight and shape (M. J. Cooper, et al., 1992). Research in agreement with this concept has shown that eating disordered people displace emotional dissatisfaction about themselves on to their bodies (Bruch, 1974). Which is not unlike the elastic

body syndrome theory (Myers & Biocca, 1992) where individuals have conflict between the 'ideal' and 'actual' self, causing dissatisfaction with one's body when this ideal is not met. On the contrary previous research has suggested that obese individuals with or without an eating disorder show no differences in the level of cognitive distortions (Volery, Carrard, Rouget, Archinard, & Golay, 2006). However, research implies that this may be explained by theories of cognitive suppression; individuals with an eating disorder may purposefully think about something else to avoid increased distress (McFarlane, Urbszat, and Olmsted, 2010). Thus, lower levels of cognitive distortions are reported in eating disordered individuals. This raises an important point: women who are more controlled or disordered in their eating may be more prone to cognitive distortions.

It has already been established that cognitive distortions are identified in a number of psychiatric conditions. In addition, clinical and psychometric evidence has shown that individuals with eating disorders are prone to distorted thinking (M. Cooper & Turner, 2000). Topical research has identified a cognitive distortion specifically associated with eating psychopathology. This is known as Thought-shape fusion (TSF)(Shafran, et al., 1999) which was developed from the theory of Thought action fusion (TAF) found to be present in sufferers of OCD (Rachman & Shafran, 1999). TAF is based on the belief that intrinsic thoughts can directly influence an external event. These thoughts are believed to be as morally wrong as carrying out the prohibited act (Rachman & Shafran, 1999). TSF was theorised on the same basic principles as TAF and has three main components; likelihood, feeling and moral. These aspects encompass the following beliefs; solely thinking about eating a fattening food makes that person feel like they have gained weight or changed shape. This increases feelings of fatness and it is as morally wrong as actually eating the food (Shafran, et al., 1999).

Research has found that TSF is significantly associated with eating disorder psychopathology as it evokes 'negative emotional and behavioural responses' (Shafran, et al., 1999). The 33 item scale is used to measure the level of TSF in individuals, which was found to have high internal consistency. TSF was found to generate a realistic connection between thoughts and the effect these thoughts would have on a person's perceived weight, shape and feelings of fatness. The concept of TSF was shown to be 'coherent, unifactorial and measurable' ensuring it can be used by others (Shafran & Robinson, 2004). Furthermore responses from the TSF scale were significantly correlated with eating disorder symptoms on all of the sub-scales (Shafran & Robinson, 2004), which was found to be more distinct in individuals with eating disorders than non-clinical controls (Shafran & Robinson, 2004). Several studies have found that TSF can be successfully induced in individuals with eating disorders (Radomsky, De Silva, Todd, Treasure, & Murphy, 2002) and individuals without eating disorders (Coelho, Carter, McFarlane, & Polivy, 2008).

Recent research by Coelho et al (2008) predicated that chronic dieters would exhibit a higher level of TSF than non-dieters after an induction of TSF based on the fact that it is indistinct whether TSF actually elicits experiences or its effects are specific to thinking. Results found that restrained eaters were no more affected by the TSF induction than unrestrained eaters. However, the results did indicate that TSF elicited behavioral and emotional changes to all participants (Coelho, et al., 2008). This suggests that TSF does produce feelings of guilt, fatness and moral-wrong doing in restrained and unrestrained eaters however, the effect is the same. More recently Coelho, Roefs and Jansen (2010) investigated whether exposure to food could induce TSF like experiences. Results found that exposure to high calorific foods showed no difference from that of the control condition (Coelho, Roefs, & Jansen, 2010). Therefore it could be presumed that actual food cue exposure does not elicit feelings of fatness, guilt and moral wrong doing in comparison with an induction of TSF.

The studies discussed have demonstrated that TSF can be experimentally induced to provide valid and reliable results in eating disordered individuals and even non-clinical controls. Furthermore findings from Shafran et al (1999) and Coelho et al (2008) found that TSF produced emotional reactions, corrective behavior and body checking, indicating that women might feel fatter after an induction of TSF. Based on this research, it could be suggested that an induction of TSF may increase body dissatisfaction.

Previous research has shown that body dissatisfaction is often a correlate of eating disorders (Thompson & Stice, 2001). This has been demonstrated by the increased emphasis on 'maintaining a thin ideal in the high incidence of eating disordered individuals' (Furnham, Badmin, & Sneade, 2002). Additionally weight, shape and size concerns are closely associated with the endeavour of restricting one's food intake (Polivy & Herman, 1985). An emerging pattern toward cognitive rigidity and bias among women with body image disturbance has become apparent (Cash, 2002). Research has found that 'body image behaviours constitute actions to alleviate discomfort and provide temporary relief from dysfunctional cognitions'(Cash, 2004). This suggests that women with body dissatisfaction may be preoccupied with specific features of their bodies that they find unappealing or unacceptable. Predisposing them to think negatively about these aspects of themselves, and that they may have difficulty integrating information that is discrepant from an existing perception of appearance. This therefore proposes that cognitive distortions may decrease satisfaction with one's body or that body satisfaction may influence the onset of a cognitive distortion through negative thinking. In support of this notion previous research found that body dissatisfaction and cognitive dysfunctions were a common problem among female students (Forrest & Stuhldreher, 2007).

Processes assessing cognitive distortions and body image are limited. Herman and Polivy's (1987) boundary model looked at physiological and cognitive perspectives in restrained and unrestrained eaters. Restrained eaters were shown to use cognitive boundaries in place of physiological boundaries, suggesting that they rely on cognitive control (Herman, Polivy, Lank, & Heatherton, 1987). Several studies have explored this notion by looking at the effect of food, weight, shape and thoughts in individuals with certain eating behaviors on body dissatisfaction (Bulik, Lawson, & Carter, 1996; McKenzie, Williamson, & Cubic, 1993). The effect of food cue exposure to high and low calorific foods on body image satisfaction in restrained eaters was investigated. Findings showed that higher dietary restraint was significantly correlated with a lower satisfaction with one's weight after exposure to high calorific foods (Fett, Lattimore, Roefs, Geschwind, & Jansen, 2009). Exposure to high calorific food was found to be associated with a decrease in body satisfaction; this was only significant for individuals with a level of high dietary restraint and an exposure to high calorific food (Geschwind, Roefs, Lattimore, Fett, & Jansen, 2008). This suggests an "exposure-induced activation of dysfunctional cognitions in restrained eaters" (Geschwind, et al., 2008). This line of research suggests that exposure to food leads to changes in weight satisfaction, which has found to occur predominantly in chronic dieters (Coelho et al., 2010).

In contrast, research found that unrestrained eaters had an increase in physiological reactivity when exposed to food (Nederkoorn & Jansen, 2002). Evidently this suggests that there is no difference between restrained and unrestrained eaters when exposed to food. Prior studies present mixed findings, thus the effect of exposure to food on body satisfaction remains unclear. In addition, the research discussed highlights how actual food-cue exposure may not be as effective as an induction of TSF. However the lack of research and inconsistent findings makes it difficult to draw conclusions about dietary restraint, TSF and body dissatisfaction.

Overall, research has shown that TSF can be induced into individuals with a variety of eating habits and that this leads to feelings of fatness, moral wrongdoing and guilt. In addition, the induction of TSF has been found to promote corrective behaviour and body checking after thinking about eating high-calorific foods (Radomsky, et al., 2002). This suggests there may be a relationship between TSF and body satisfaction. What is more previous studies have only found an effect of food-cue exposure on body satisfaction (Fett, et al., 2009). Presumably, an induction of TSF in high dietary restrained eaters would increase body dissatisfaction more than exposure to actual food. The fact that TSF produces feelings of fatness, it is reasonable to assume that this would affect a persons' body satisfaction. The research discussed highlights certain gaps in the literature which allows the current study to investigate these questions.

Existing research regarding TSF is limited. To date, there has been no direct comparison between the *Thought–shape fusion questionnaire* (Shafran, et al., 1999) and the level of dietary restraint in individuals, measured by the *Eating Attitudes Test (EAT 26)* (Garner, Olmsted, Bohr, & Garfinkel, 1982). Although eating disordered individuals have been shown to be more susceptible to cognitive distortions, recruiting individuals with eating disorders is very difficult and there are numerous ethical issues involved with this. Research has shown that TSF can be induced into individuals with different eating behaviours however results are inconsistent in terms of restrained and unrestrained eaters. Therefore high and low restrained eaters were considered for this project.

Due to mixed findings regarding food cue exposure, the induction of TSF and dietary restraint, this study integrated areas that were in need of replication with areas that have not been considered previously. No effect has been established between TSF and dietary restraint and body dissatisfaction directly, thus investigation to further understand this relationship provided new research in the field of cognitive distortions and TSF. TSF has been shown to evoke feelings of ‘moral wrong-doing and feelings of fatness’ (Coelho, et al., 2008) whilst high-restrained eaters have been found to be more dissatisfied with their bodies after the exposure to high calorific foods (Fett, et al., 2009). There were two main aims of this project; to examine whether there was a relationship between TSF and dietary restraint, and whether the induction of TSF had any effect on body satisfaction (measured by the body dissatisfaction subscale of the Eating Disorders Inventory-BDI) in individuals with high and low dietary restraint.

It was hypothesised that there would be a positive association between the TSF scale and the EAT-26; participants who scored high for dietary restraint would also score highly on the TSF scale. It was also hypothesised that individuals with a measure of high dietary restraint would have a greater increase in body dissatisfaction due to the TSF induction. Individuals with a measure of low dietary restraint would therefore have no change in their body satisfaction. Finally, relevant controls (restrained and unrestrained eaters) in both conditions would have no change in body satisfaction.

## **Method**

### **Design**

Phase 1: A correlational research design was employed whereby dietary restraint was assessed using the *Eating Attitudes Test (EAT 26)*, (Garner, Olmsted, Bohr, & Garfinkel, 1982) and TSF was measured using the *Thought-shape fusion scale* (Shafran, Teachman, Kerry &, Rachman, 1999). Body dissatisfaction was measured using the *Body Dissatisfaction subscale of the Eating Disorders Inventory (BDI)* (Garner, Olmstead, & Polivy, 1983). Although the BDI sub-scale was not needed for



the purpose of the correlation, it was required in Phase 1 as it had to be measured before and after the type of intervention used in Phase 2.

Phase 2: A mixed 2 x 2 x 2 experimental design was used. An independent groups design was used to measure the participant's level of dietary restraint on the EAT questionnaire. This factor consisted of two levels; individuals who had a measure of high dietary restraint and those with a low measure of dietary restraint. In both the high and low conditions, participants were then further randomly allocated into one of two groups; experimental or control. This factor was also an independent groups design. Participants received the TSF induction in the experimental group and received the control induction in the control group. The independent variable in phase 2 was the type of intervention received; (TSF or control induction). The third factor in phase 2 was the time of the assessment of body dissatisfaction. This was a repeated measures design containing 2 levels; before and after. Any change in body dissatisfaction was recorded before (in phase 1) and after the interventions, (in phase 2). The dependant variable was any change in body dissatisfaction.

## **Participants**

Participants were selected by the means of opportunity sampling. The vast majority of the participants were undergraduate students from Northumbria and Newcastle Universities. The sample also consisted of individuals who lived and worked in Newcastle upon Tyne. A total of 62 females took part in phase 1 (age range 18-25, mean = 20.98 years, SD = 1.22). For Phase 2 participants were recruited on the basis of their results from phase 1. Garner et al (1982) stated that a score of 15 or above may still constitute to having abnormal eating behaviours. Therefore in the absence of clinical assessment the cut-off point used in this study for abnormal eating behaviours on the EAT-26 was 15 or above, 14 females qualified for the high dietary restraint group. The low dietary restraint group was comprised of 14 females with a score between 0-4. This was necessary as this study wanted to investigate the extremes from the EAT-26 i.e. the most and least symptomatic. The high dietary restraint group had a mean age of 20.86 years (age range 20-25, SD = 1.61). The low dietary restraint group had a mean age of 21.21 years (age range 18-25, SD = 1.37). The high and low dietary restraint groups did not differ significantly in age (APPENDIX M). There were no special requirements to participate. All females participated voluntarily and were not known to have any abnormal eating behaviour's before testing.

## **Materials**

Thought–shape fusion questionnaire: The TSF scale (Shafran et al., 1999) is a 33-item self-report questionnaire which covers the three domains of thought-shape fusion; likelihood, moral and feeling components. Examples of items include; 'Just thinking about "pigging-out" makes me want to weigh myself', 'Just thinking about not

exercising can change the way I really look', 'I'm going to lose control and eat the food'. Participants had to rate their agreement with each statement on a scale from 'not at all' (0) to 'totally' (4). The TSF scale was used in phase 1 to determine if TSF and eating attitudes had any direct relationship. The TSF scale has shown to have a high internal consistency and predictive validity. Cronbach's alpha = 0.96 (Shafran et al., 1999).

The body dissatisfaction subscale of the Eating Disorders Inventory (EDI): The BDI subscale (Garner, Olmsted, & Polivy, 1983) was used to measure the participant's body dissatisfaction, before and after the type of intervention. The BDI subscale consisted of 9 items which were specifically associated with parts of the body related to fat increases and known areas of the body to cause dissatisfaction. e.g., "I think that my thighs are too large" and "I like the shape of my buttocks". Participants had to rate how much they agreed with each statement. The scale was altered for the current study from a 6-point Likert scale (ranging from always to never, with the same scoring used in the EAT-26) to a visual analogue scale (VAS). Participants had to mark an 'X' on the 10cm line, showing how much they agreed with each statement: 0 being disagree, 10 - agree. The scale was altered to ensure that participants could not remember how they answered in phase 1. The reliability of the original BDI sub-scale was; Cronbach's  $\alpha = 0.91$ . The reliability of the BDI in the current study was tested twice with the same participants. It showed high reliability on both accounts; before: Cronbach's  $\alpha = 0.915$ , after: Cronbach's  $\alpha = 0.953$ .

Eating Attitudes Test (EAT 26): The EAT questionnaire (Garner, et al., 1982) was used to measure the amount of dietary restraint in participants. The EAT is a standardised self-report measure which is used to identify whether a person's eating behaviours and attitudes warrant further evaluation. It is used to measure abnormal eating patterns concerned with symptoms and characteristics of eating disorders. It is a 26-item questionnaire which has a 5 point response format ranging from 'always' (3) to 'never' (0). Question 26, is reversed scored; 'always' (0) and 'never' (3). Participants had to rate how much they agreed with each question by using the 5 point response format. Examples of questions from the EAT-26 are; 'I feel extremely guilty after eating', 'I display self-control around food', and 'I engage in dieting behaviour.' The EAT-26 has reported a high degree of internal reliability Cronbach's  $\alpha = 0.83$  and a high level for both concurrent and consistent predictive validity.

TSF induction: High and low experimental groups in phase 2 were subjected to the TSF induction. Participants were asked to imagine a food they deemed to be extremely fattening for 40 seconds. Participants were then asked to imagine eating large quantities of this food and how full they would feel on consumption of this fattening food. After another 40 seconds had passed, participants were instructed to write the sentence "I am eating....." and to fill in the blank with the fattening food they were imagining. The induction was necessary to establish whether it affected body

dissatisfaction. No specialised equipment was needed in either phase 1 or 2. The only equipment needed was a pen and paper for phase 2.

## **Procedure**

Phase 1- pre-screening experiment. A pre-screening study was employed to identify the measure of dietary restraint in individuals and verify whether there was a relationship between an individual's eating attitudes and level of TSF. The experimental study was granted ethical approval from the Undergraduate Ethics Committee (APPENDIX H). Phase 1 of the study took place in the Northumberland building on Northumbria University city campus. Participants were firstly given information about the study and asked to sign informed consent forms and fill out an information sheet (APPENDIX A, B, and C). Participants were then asked to complete the questionnaire package including; The EAT-26, the TSF scale and the BDI sub-scale. This was done individually. Participants were then informed that they may be required to take part in the second phase of the study which was dependant on their scores from phase 1. The follow up study took place 1 week later. Participants were informed that they had the right to withdraw. All participants were fully debriefed after they had completed the questionnaires and were assured all questionnaires would be kept confidential (APPENDIX D).

Phase 2 - Experimental induction. Phase 2 took place in a quiet room in the Northumberland building on Northumbria city campus. Before the second phase commenced, participants had already been allocated into one of the four conditions based on their results from phase 1. Participants who scored high for dietary restraint were randomly allocated into one of two groups; experimental or control. The same was done for participants who scored low for dietary restraint. For each group, the participants were given appropriate information regarding the group they were allocated to (APPENDIX E). Participants were then asked to fill out informed consent forms (APPENDIX F).

In each condition participants were subjected to an induction. In the control groups (high and low), participants were asked to think about a recent book or film they had read/seen, and imagine chatting about this with a friend. They were then asked to write the sentence "I am chatting about....." After the control induction, participants were then given the BDI scale to complete again. In each experimental group (high and low) participants were subjected to an induction of TSF whereby they were asked to think about eating large quantities of a food they deemed to be fattening. They were then asked to write the sentence "I am eating....." After the induction of TSF, participants had to complete the BDI scale. Participants in the experimental groups were given a neutral induction at the end where they were asked to think about eating a healthy food or exercising, and write the sentence "I am eating..." or "I am exercising." No neutral induction was needed for the control groups. Participants

in the same groups were tested at the same time i.e. all the individuals in the experimental high dietary restraint group received the induction of TSF at the same time. Upon completion of the study all the participants were thanked. Debrief sheets on the study and how they could withdraw was given to each participant (APPENDIX G). Finally, project feedback sheets were made available to all participants (APPENDIX P).

## Results

Phase 1: It was hypothesised that there would be a positive correlation between the EAT-26 and TSF scale: individuals with a high score on the EAT-26 (a measure of high dietary restraint) would elicit higher scores on the TSF scale. Those with a lower level of dietary restraint would obtain a lower score on the TSF scale. Table 1 displays the means, standard deviations and ranges of the scores from all three questionnaires used in phase 1. The BDI data were of use in Phase 2.

**Table 1**

Mean (SD) and range of scores on each of the measures and age (N=62)

	<i>Mean (SD)</i>		<b>Minimum</b>	<b>Maximum</b>
<b>TSF</b>	21.4	(21.0)	.00	88.00
<b>Dietary Restraint</b>	9.8	(11.0)	.00	50.00
<b>BDI</b>	52.6	(18.8)	8.10	89.80
<b>Age</b>	20.98	(1.22)	18	25

Phase 1 was also used to establish the groups for the second phase of the study. Table 2 displays the number of participants in each category, based on their scores from the EAT-26.

**Table 2**

The number of participants in each category from scores on the EAT-26 (N=62)

	<b>Score on dietary restraint</b>				
<b>Category</b>	0-4	5-9	10-14	15-19	20+
<b>Number of Participants</b>	25	14	9	5	9

Table 2 indicates that 14 females scored 15 or above on the EAT-26. They were highlighted as the most symptomatic from Phase 1. These 14 were used to form a high dietary restraint group for Phase 2. Table 2 shows that 25 participants scored between 0-4 on the EAT-26, these were underlined as the least symptomatic. These 14 were used to form a low dietary restraint group for Phase 2. The participants who scored between 5 and 14 were not considered for the second phase as they were deemed to have 'normal' eating behaviours and attitudes, thus a healthy level of dietary restraint.

A correlation was the method of analysis used in phase 1 to determine whether there was a relationship between the level of dietary restraint (EAT-26 questionnaire) and level of TSF (TSF scale) in individuals. The correlation verified the hypothesis that a higher measure of dietary restraint is associated with a higher level of TSF (APPENDIX I for SPSS outputs). There was a significant positive relationship between dietary restraint and TSF ( $r = .714$ ,  $p < 0.0005$ , two tailed). The correlation was strong as 50% of the variation was explained. This therefore suggests that individuals who are more controlled in their eating habits have higher levels of TSF.

Phase 2: A one-way analysis of variance (ANOVA) confirmed no significant difference in age between the high dietary restraint group and the low dietary restraint group formed from phase 1 [mean (SD) high = 20.86 (1.61); mean (SD) low = 21.21 (1.37)]. There was found to be no significant difference between the low and high conditions for age,  $F(1,27) = 0.400$ ,  $p = 0.533$ . This ensured that individual differences between the two groups were reduced (APPENDIX L for SPSS outputs).

The format of the BDI subscale was changed (as explained in the method) for this reason reliability for the scale had to be established. This was tested before and after the interventions. The reliability of the BDI scale before was found to be high, Cronbach's  $\alpha = 0.915$ . Reliability of the scale after was also high; Cronbach's  $\alpha = 0.953$ . (SPSS and data outputs are in APPENDIX N for SPSS outputs). It was hypothesised that the high dietary restraint group would experience an increase in body dissatisfaction, but those in the low dietary restraint group would not. No change in body dissatisfaction was predicted in the control conditions.

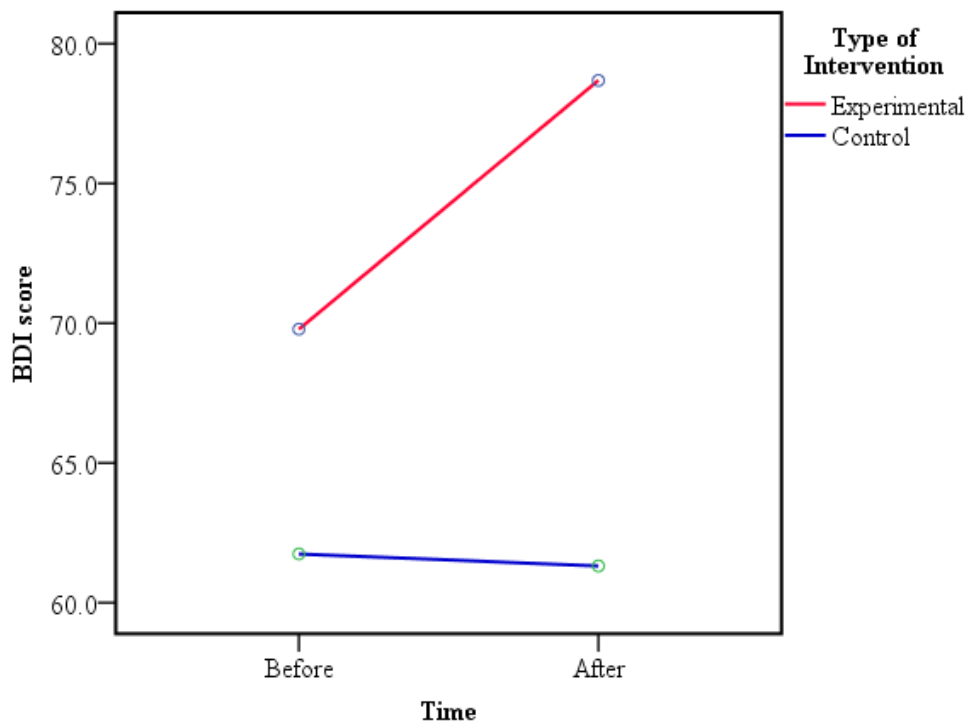
**Table 3**

Means (SD) of scores before and after each intervention for high dietary restraint (N=14)

	Type of Induction	
	Experimental <i>Mean (SD)</i>	Control <i>Mean (SD)</i>
<b>Before intervention</b>	69.8 (6.3)	61.7 (19.8)
<b>After intervention</b>	78.7 (9.9)	61.3 (16.3)

Table 3 shows the means and standard deviations across the two groups: time and type of induction for the high condition. A mixed 2 X 2 ANOVA revealed no significant main or interaction effects. Neither intervention had any significant effect on body dissatisfaction. However, a critical trend was identified which supported the hypothesis of a decrease in body dissatisfaction following the TSF intervention, but not following the control intervention,  $F(1,12) = 3.713$ ,  $p = 0.078$ .

### High Dietary Restraint



**Figure 1:** Plots illustrating the trend between the change in body dissatisfaction (as measured on the BDI sub-scale) before and after the type of induction (N=14)

In order to investigate this trend a paired samples t-test was conducted on the body dissatisfaction scores before and after the intervention with TSF and before and after the control intervention. This revealed a significant difference in body dissatisfaction following the TSF induction; ( $t = 3.051$ ,  $df = 6$ ,  $p = 0.022$ , two tailed). Following Bonferoni corrections this remained significant ( $0.05/2$  critical p value  $p < 0.025$ ). The effect size for the TSF induction was calculated (Cohen's  $d$ );  $d = 0.61$  which is (according to Cohen) a 'large' effect size. This significant trend therefore implies that following an induction of TSF body dissatisfaction is increased in high restrained eaters (APPENDIX K for SPSS outputs). No significant change in body dissatisfaction was found for the control intervention

**Table 4**

Means (SD) of scores before and after each intervention for low dietary restraint (N=14)

<b>Low Dietary Restraint</b>		
	<b>Type of Induction</b>	
	<b>Experimental</b>	<b>Control</b>
	<i>Mean (SD)</i>	<i>Mean (SD)</i>
<b>Before intervention</b>	39.9 (20.3)	41.3 (19.2)
<b>After intervention</b>	37.4 (18.2)	38.0 (18.9)

Table 4 displays the means and standard deviations across the two groups: time and type of induction for the low condition. Again a mixed 2 X 2 ANOVA revealed no significant main or interaction effects. Neither intervention had any significant effect on body dissatisfaction (APPENDIX J and M for SPSS outputs).

## **Discussion**

The focus of the current study was to investigate whether there was a relationship between the level of TSF and the measure of dietary restraint (Phase 1 of the study). The hypothesis was that those individuals who had a high level of dietary restraint would elicit a higher score on the TSF scale. The results from the present study were in agreement with the hypothesis and revealed that there was a positive affiliation between the two. The second aim of the study was to induce TSF into individuals

with different measures of dietary restraint in a laboratory setting (Phase 2 of the study). Techniques described previously were used to identify any significant increase in body dissatisfaction. It was expected that higher restrained eaters would have an increase in body dissatisfaction after the induction of TSF. It was additionally expected that there would be no significant increase in body dissatisfaction after either intervention in the control and low dietary restraint groups. Contrary to expectations the findings revealed that there was no significant main effect of the TSF induction on body dissatisfaction in the high dietary restraint group. However further analysis provided evidence which supported the original hypothesis. A statistical trend was identified in the high dietary restraint group after the experimental induction of TSF, where a significant increase in body dissatisfaction was found. As predicated there was no significant difference in body dissatisfaction in the low dietary restraint group or either control groups.

Whilst there seems to be no existing literature equivalent to investigating the direct relationship between TSF and dietary restraint, past research has investigated similar aspects to the present study. Evidence to support these findings found that eating disorder psychopathology has a high association with TSF in a clinical sample (Shafran, et al., 1999). Although the current sample was of a non-clinical nature, a relationship was still found; higher restrained eaters displayed a higher score for TSF. One explanation for this positive association is that individuals with a higher level of dietary restraint might be more prone to cognitive distortions, i.e. TSF. Evidence by Radomsky, De Silva, Todd, Treasure, & Murphy, (2002) are in agreement with this. Radomsky et al (2002) successfully showed that TSF is more reknown in individuals with eating disorders. It could therefore be argued that even in a non-clinical sample, females with a high level of dietary restraint may have similarites to eating disoreded individuals in terms of cognition.

The results further highlight the concept that, the way that people think about food may affect their consequential behaviour. When considering higher restrained eaters, the possibility of gaining weight or feeling fat from only thinking about food may elicit more controlled eating habits which may or may not lead to disordered eating. Herman and Polivey's (1984) boundary model is in line with this research. They proposed that restrainend eaters rely on cognitive control to mointor their eating behaviours. Therefore it is plausible to suggest that people who experience TSF to a greater degree are more controlled in their eating and might be more susceptible to having an eating disorder. Interestingly, alternative research by Coelho et al (2008) contradicts the present findings. Coelho et al (2008) demonstrated that there was no difference in the level of TSF between restrained and unrestrained eaters. This may suggest that there is no difference in the way restrained and unrestrained eaters think about food. As such, the findings from this study appear to join existing inconsistent research. However it could be argued that Coelho et al (2008) did not specifically investigate the relationship of TSF and dietary



restraint directly. Other factors such as anxiety and behavioural effects were investigated which may have had unknown consequences on the effect of TSF influencing the outcome their results. Future research is needed to establish a causal relationship between TSF and dietary restraint, as the findings only suggest an association between the two. From this cause and effect can be understood and therefore this would clarify whether TSF increases abnormal eating behaviours or if TSF is a product of abnormal eating.

Contrary to expectations the overall results from the second stage of the study are not entirely consistent with the findings from previous research on TSF, (Coelho, et al., 2008) restrained eaters (Fett, et al., 2009) and body dissatisfaction (Geschwind, et al., 2008). Again, past research is limited regarding TSF and body dissatisfaction. Once more this is due to no exact comparable research in this area. However earlier research has investigated similar components. Shafran and Robinson (2004) showed that TSF can be experimentally induced in individuals, increasing feelings of guilt, moral wrong doing and feelings of fatness (Shafran & Robinson, 2004). Following the induction of TSF in the present study there was no increase in body dissatisfaction. This was unexpected as previous research has shown there to be an effect of food cue exposure on increasing body dissatisfaction (Fett, et al., 2009). Furthermore Radomsky et al (2002) found that TSF could be induced into clinical individuals. In line with this research, Coelho et al (2010) assured that food-cue exposure was not as effective as TSF at eliciting TSF-like experiences in individuals. It was therefore assumed that there would be an increase in body dissatisfaction in high restrained eaters based on these findings.

One explanation for these results is that individuals with a higher dietary restraint may have engaged in cognitive suppression when being subjected to the TSF induction. Evidence supporting this has shown that unrestrained and restrained eaters have been found to show no differences in weight satisfaction following the induction of the body displacement theory (displacing negative feelings onto their body) (McFarlane, Urbszat & Olmsted, 2010). According to McFarlane, Urbszat and Olmsted (2010) the present findings could be because higher restrained eaters try to suppress thoughts about eating food. Participants may have purposefully not thought about the effects of the food, as they may have found this too distressing. Coelho et al (2008) lends support for this as they found there to be no difference in the experience of TSF in restrained and unrestrained eaters. It may be reasonable to suggest that cognitive suppression may have accounted for no significant difference in body dissatisfaction between high and low dietary restrained eaters. Although this may provide an explanation for the results, previous research discussed and the current study used different methods to assess any change in body dissatisfaction. On this basis the effects of body displacement may be different to that of TSF there is no research to suggest that cognitive suppression is linked with TSF. Consequently, higher restrained eaters may not have experienced cognitive

suppression as a result of TSF; the study may have been underpowered by other factors. For example a small sample. The present study's findings lend support for this as even though there was no overall significant effect, there was still a difference in body dissatisfaction after the induction between the high and low dietary restraint groups. Moreover further analysis identified a statistical trend confirming the predicted hypothesis; high restrained eaters in the experimental group showed an increase in body dissatisfaction following the induction of TSF. Thus, it is reasonable to assume that there is a real effect of TSF on body dissatisfaction. Future research should consider replicating the current study with a bigger sample, to ensure the effect is real in restrained eaters. This would confirm the findings from this study, furthermore using a bigger sample would make the results more representative of the population.

The research discussed cannot draw noteworthy comparisons with the current study since no previous research has directly considered the association between TSF and the measure of dietary restraint. Furthermore prior research has not explored any effect of TSF on body dissatisfaction. It is therefore difficult to explain the current findings in terms of previous studies. It can be assured that for this reason the present study provides distinctive and unique findings. To a certain extent the current study overcomes limitations from existing literature. The findings extend the knowledge in the field of TSF and eating behaviours due to the lack of inconsistent findings from numerous aforementioned studies. Both findings from the present study are therefore novel contributions to existing literature.

It is important to highlight limitations with the current study. It could be argued that the results are not reliable due to a lack of any prior investigation specifically in this area of TSF and body dissatisfaction. However results were almost certainly underpowered by a small sample size, not because of the design of the study. The sample size of 28 was small for the second phase of the study, as only 7 participants took part in each condition. Previous studies have used samples of at least 60 participants when investigating TSF (Shafran & Robinson, 2004). However, a small sample was unavoidable due to the selection process used which was dependant on the results from phase 1. This is arguably the reason for non-significant findings. Any anomalies in the data would have had a great effect on the results due to such a small sample size. As already considered, further analysis still found a significant trend with a large effect size. Based on this it is feasible to suggest a significant reliable trend was found from the results. These results provide a great contribution to the literature on TSF, as new findings have been discovered that have not previously been considered.

It could be argued that the sample was not representative of individuals with different eating behaviours. Although a non-clinical sample was used, none of the results can be explained by atypical samples. The individuals were emblematic in terms of

abnormal eating attitudes as the current sample was tested against the norms from the EAT-26. Therefore the sample was appropriate for the present study and is representative of individuals with different dietary restraint. A further limitation which must be addressed is that the BDI subscale was changed to a visual analogue scale (VAS). Previous studies have used Likert scales when assessing body dissatisfaction such as Garner et al (1982). Therefore by changing the scale, this may have affected the reliability of assessing any change in body dissatisfaction. However, it was necessary to change the scale to ensure participants did not answer in the same way. This reduced bias as participants could not remember how they previously answered. To certify the VAS was a consistent measure, reliability was tested twice (before and after the inductions). Reliability on both accounts was found to be high. This indicates that the measure used to assess body dissatisfaction was highly valid and reliable. From this it can be assured that there was nothing wrong with the design of the study to cast doubt on the integrity of the results found.

Implications of the results are that future studies can draw on these findings as a way of understanding dieting behaviour. Foremost, it has been identified that in the current sample 14 out of 60 females exhibited eating disorder symptoms. Although the females in the high dietary restraint group were at the high end of 'normal' in terms of eating behaviours, this finding provides enormous insight into the amount of non-clinical females exhibiting abnormal eating behaviours and patterns. Currently research and theories explain how eating disorders are most common in individuals with severe eating patterns and behaviours. However, the findings from this study provide evidence against this. Theoretical implications of the results may include a revision of current theories on eating disorders and TSF. At present TSF is known as a cognitive distortion associated with eating psychopathology (Shafran, et al., 1999). The current study has established that TSF is not only apparent in eating disordered individuals, but certain persons who follow dieting behaviour. Additionally, highlighting individuals with a high level of dietary restraint may aid in identifying the onset of negative thoughts pertaining to the development of TSF. This subsequently may prevent the inception of further abnormal eating behaviours in female students.

Future research may want to explore therapeutic interventions to combat the onset of eating disorders. TSF has been shown to make people feel fat and increase their body dissatisfaction by inducing a change in their thinking. For this reason can people be made to feel thin by doing the opposite? Future studies should explore this idea through the use of imagery, thoughts and schemas to change cognition positively. This would be useful in therapeutic interventions as it could support individuals with eating disorders, low self esteem or abnormal eating behaviours by changing how they think about themselves. Elements of CBT could be incorporated with this, as CBT is involved in stopping the process of negative thoughts.

Alternatively future studies might want to examine the effect of certain aspects of TSF on body dissatisfaction that the current study neglected to investigate. For example; the present study looked at TSF as a whole, however there are different features of TSF including; concept or interpretation. Concept covers the three domains of TSF; likelihood, moral and feeling. Interpretation is involved with the elucidation of thinking about eating a fattening food. Both features are related to questions on the TSF scale and were not addressed independently in the current study. On this basis, future research may want to investigate whether certain questions corresponding to 'concept' and 'interpretation' are more associated with an increase in body dissatisfaction. Finally, only one of the experiences that TSF elicits was considered in the present study. TSF elicits has been found to elicit feelings of moral wrong-doing and guilt, not just feelings of fatness. Future research may want to assess how guilty individuals feel when they think about eating a fattening food, and whether this has a relationship with an increase in body dissatisfaction. Does guilt make a person feel less satisfied with their body?

In conclusion this study was based on investigating the relationship between TSF and dietary restraint, as well as the effect of TSF on body dissatisfaction in individuals with high and low dietary restraint. This was based on limited existing research and inconsistent findings from prior research. The present study provides evidence to support these hypotheses. Although there was no overall significant effect on increasing body dissatisfaction in high restrained eaters, following an induction of TSF. There was no reason to cast any doubt on the results obtained due to further analysis which showed a large effect size in the small sample used. These findings have revealed insight into abnormal dieting behaviour in non-clinical samples which may aid in therapeutic interventions. Future research would benefit individuals with eating/dietary problems by replicating the current study with a larger sample and investigating the effect of TSF on body dissatisfaction further.

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