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Dieter's Deficit: Preoccupation And Working Memory

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DIETER'S DEFICIT: PREOCCUPATION AND WORKING MEMORY

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This thesis, submitted by Kelly Cuccolo in partial fulfillment of the requirements for the Degree of Master of Arts from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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Kelly Cuccolo

Date 5.2.18

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for their unwavering support.

ABSTRACT

Preoccupying thoughts can cause disruptions of ones' attentional system and may arise as the result of a clinical disorder, societal pressures, or individual predispositions. Goal acquisition requires one to be preoccupied with one's behaviors in order for success to be achieved, for example dieters must monitor their weight and caloric intake. As dieting is a widespread phenomenon in American culture it is important to understand the cognitive effect of preoccupation. This study examines the relationship between obsessional thoughts about food, weight, and shape, and cognitive task performance. The performance of Dieters and Non-Dieters on a battery of specific working memory tasks was compared, and the extent to which preoccupying thoughts contributes to this effect was be investigated. Our hypothesis is that dieters will show a verbal working memory deficit compared to non-dieters, was partially supported. These deficits were not attributable to general neuropsychological functioning differences between dieters and non-dieters.

CHAPTER I

INTRODUCTION

Every day people are required to filter the numerous stimuli that that they encounter in their environments. The external stimuli encountered in a persons' environment is so vast and constant that individuals could not possibly process or attend to everything. Individuals instead focus on, or pay attention to, stimuli that are particularly relevant or salient. Attention is what allows individuals to concentrate on the conversation they are having with a friend while party guests chat loudly in the background. Attention, a selective mechanism of perception and response, allows us to function effectively in an environment full of stimuli (Treisman, 1969). In certain instances, however, people experience sudden thought intrusions. While helpful in some circumstances (i.e. insight) these intrusions can become persistent and disruptive (Klinger, 1999; Levaux, Larøi, Offerlin-Meyer, Danion, & Van der Linden, 2011). Disruptions to the operation of the attentional system pose a spectrum of problems depending on the severity of the disruption.

For example, Obsessive Compulsive Disorder (OCD) consists of obsessions, (persistent thoughts that generate feelings of anxiety) and compulsions (repetitive mental or physical acts performed with the desire of reducing anxiety) (American Psychiatric Association, 2013). Research has found that patients with OCD devote increased attentional resources to stimuli relating to their obsessions and compulsions (McNally, Amir, Louro, Lukach, Riemann, & Calamari, 1994; Tata, Leibowitz, Prunty, Cameron, & Pickering, 1996). Furthermore, patients

experience intrusive and undesirable thoughts that are paradoxically increased in frequency when efforts to control such thoughts are made.

The obsessional thoughts and compulsions restrict patients' social and occupational options. Subsequently, patients report lower levels of quality of life in the domains of psychological well-being, social relationships, and overall quality of life compared to healthy controls and those effected by schizophrenia (Stengler-Wenzke, Kroll, Matschinger, & Angermeyer, 2006). The attentional biases for threatening stimuli in OCD provides an example of how intrusive thoughts can affect ones' level of functioning (Muller & Roberts, 2005).

Those affected by schizophrenia experience intrusive thoughts that manifest as hallucinations and delusions. A case study by Levaux and colleagues (2011) explored a novel therapy, Attentional Training Technique (ATT), as a way to shift excessive self-focus linked to psychotic symptoms to the external environment. ATT modifies thought patterns that perpetuate and maintain excessive self-focus, and thereby, intrusive thoughts. The application of ATT lead to a reduction of intrusive thoughts, which was maintained at six-month follow up.

Anorexia Nervosa (AN) is a disorder characterized by low body weight, as well as a preoccupation with food and body shape. This preoccupation exists cognitively (as intrusive thoughts) and also behaviorally, as those with AN engage in repetitive ritualized behaviors (e.g., cutting food into tiny pieces). Indeed, the intrusive thoughts regarding food and body shape are so influential that relapse and mortality rates are extremely high (Channon, De Silva, Hemsley, & Perkins, 1989; Eckert, Halmi, Marchi, Grove, & Crosby, 1995; Steinglass & Walsh, 2006; Sullivan, 1995). Further still, there is some evidence that preoccupation with food and body shape can be linked to cognitive deficits observed in AN (Steinglass & Walsh, 2006). For

example, Kemps, Tiggemann, Wade, Ben-Tovim and Breyer (2006) found that AN participants performed more poorly than controls on several memory tasks and that preoccupying cognitions accounted for a significant portion of this variance.

It is also apparent that this phenomenon of preoccupying thoughts occurs on a subclinical level as results from Kemps and colleagues (2006) also applied to dieters, such that dieters performed similarly to AN participants on one of the specific memory tasks administered. It appears that concerns regarding weight, shape, and appearance may manifest themselves in such a way that they become preoccupying and develop the ability to affect one's cognitive function. Thus, it appears that differing disruptions of the attentional system can result in the manifestation of intrusive thoughts that become problematic for ones' functioning. However, the effect of preoccupying cognitions in subclinical disorders is not well understood. As American culture is becoming increasingly obsessed with thinness, and women are stringently held to media driven standards (Dittmar & Howard, 2004), it is important to understand how this preoccupation with shape and weight may cognitively affect women.

Furthermore, given that frequency of dieting is linked to development of an eating disorder, it is important to understand the extent to which preoccupation results in life impairment and cognitive impairment (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997). This paper serves to explore how preoccupation with shape and weight manifests in the context of cultural pressure. Cultural pressures regarding dieting and subsequent cognitive effects, with a focus on preoccupying thoughts, will then be explored.

Fat as a feeling

Self-report experiences of "feeling fat" are wide spread among patients with AN, dieters, and non-dieters (Cooper, Deepak, Grocutt, & Bailey, 2007). For example, Cooper, and colleagues (2007) conducted a semi-structured interview to explore cognitive and behavioral components of feeling fat in women with AN, dieters and non-dieters. In this study, the researchers interviewed participants about emotional, behavioral, and physiological experiences of feeling fat. The researchers then explored early memories of feeling fat, as well as negative rational and emotional core beliefs.

Results revealed that AN participants tended to associate feeling fat with guilt while dieters associated feeling fat with frustration. Both the AN group and dieters exhibited high levels of internal body sensations when experiencing feeling fat, which was positively correlated with negative self-evaluations and high levels of distress. This finding is particularly concerning as there appears to be a very high prevalence rate for feeling fat.

Indeed, most women and a quarter of men who are within a normal weight range perceive themselves as over-weight (Cash & Hicks, 1990). By administering a survey to both male and female participants Cash and Hicks (1990) examined self-perceived fatness in relation to behavioral and psychological variables. Researchers observed that those who self-classified as over-weight reported more frequent binging, higher levels of dietary restraint (chronic dieting), and lower levels of well-being compared to controls. Furthermore, when self-classified participants were compared to participants who were objectively classified as over-weight, few differences emerged. Therefore, self-perceptions of fatness seem to result in similar levels of psychological distress compared to those who are objectively over-weight.

Feeling fat has also been shown to be associated with certain personality characteristics. Striegel-Moore, McAvary and Rodin (1986) investigated behavioral and psychological areas that

were hypothesized to be correlated to feelings of fatness. In the first study, a multiple regression analysis found that perfectionism was a significant predictor of feeling fat. Feeling fat was also significantly related to both frequency of dieting, and frequency of binging, such that, women who reported feeling fat also frequently participated in dieting, and binging.

In a follow up study researchers specifically examined the relationships between feeling fat and eating behaviors. Perceived hunger emerged as a significant predictor of feeling fat in the regression analyses. While correlational analyses cannot result in cause and effect statements, it is plausible that feelings of hunger may elicit preoccupations with food, shape, or weight, hence leading one to "feel fat" (Striegel-Moore et al., 1986).

Dieting Behaviors and Well-Being

As feelings of fatness have become a common experience, dieting among women is also extremely prevalent. A survey of over 4,000 adults found that 75% of the women and over half of high school girls sampled have been on at least one diet in their lifetime (Jeffery, Adlis, Forster, 1991; Schoen, Davis, Collins, Greenberg, Des Roches, & Abrams, 1997). While the phrase 'dieting' can take on a wide variety of meanings, the overarching conceptualization of dieting is defined as engaging in behaviors in order to reduce or maintain ones' weight (De Ridder, Adriaanse, Evers, & Verhoeven, 2014). These behaviors are often categorized as healthy (e.g. increasing vegetable intake) or unhealthy (e.g. skipping meals) (Ackard, Croll, & Kearney-Cooke, 2002).

Unfortunately, many people who diet often use unhealthy behaviors. A survey of adolescents found that 43% of girls in grades nine and 12 grade reported fasting or skipping meals to lose weight, and the use of diet pills was as high as 8% (Minnesota Student Survey,

1998). A survey taken by participants of a weight-gain prevention program revealed that 22% of women had used an unhealthy weight reduction behavior in the past year (Neumark-Sztainer, Sherwood, French, & Jeffery 1999). While dieting is often regarded in a positive light when used with over-weight individuals to improve physical health (Center for Disease Control and Prevention, 2015), the majority of dieters in a college population are not considered over-weight or obese (Ackard, Croll, & Kearney-Cooke, 2002). Even more troublesome, is that those engaging in weight loss efforts may utilize risky weight loss behaviors, such as vomiting (Wharton, Adams, & Hampl, 2008).

Dieting has been linked to negative consequences including depression, low self-esteem, body dissatisfaction, eating disordered pathology, and cognitive impairments (Ackard, Croll, & Kearney-Cooke, 2002; Green, Elliman, & Kretsch, 2005; Vreugdenburg, Bryan, & Kemps, 2003). For clarity, dieting has shown to be correlated with various psychological effects pertaining to mood. Ackard, Croll and Kearney-Cooke (2002) obtained self-reported data on lifetime frequency of dieting and depression, affect regulation, eating disorder symptomology, body image, and self-esteem. Dieting was found to show a significant positive correlation with affect dysfunction a measured by the Trait Meta-Mood Scale, and self-reported depression. This is particularly troubling as dieting is a widespread practice in American culture and has the potential to negatively impact one's quality of life.

Specifically, dieting behaviors have been linked to the subjective component of quality of life – life satisfaction. Briefly, life satisfaction aligns with psychological well-being in the sense that individual goals, needs, and desires are met. Therefore, individuals may change behaviors in attempt to increase life satisfaction or life satisfaction may influence ones' behaviors. Behaviors that are either implemented in relation to life satisfaction are not always positive (Frisch, 2006;

Zullig, Pun, & Huebner, 2007). Zullig, et al. (2007) collected self-report data from university students regarding life satisfaction, various eating behaviors, and degree of worry regarding the aforementioned behaviors. Poor dieting behaviors and perceptions of weight were found to be associated with life dissatisfaction. This may be explained, in part, by correlations between feeling fat and perfectionism, comparing one's self to others, and transcendence between failure in non-weight domains and negative feelings about one's body. Women who "feel fat" engage in frequent dieting, and have high levels of preoccupation regarding weight and shape. This, alongside self-comparison behaviors, may result in a cycle in which dieters feel unsatisfied and unsuccessful (Striegel-Moore et al., 1986). This notion is supported by findings that chronic dieting is prevalent across ethnicities and genders in the United States (Cachelin & Regan, 2006).

Cognitive strategies have recently been implemented as a way to benefit weight loss program participants physically and psychologically. One such effort by Cooper and Fairburn (2001) focuses on addressing psychological obstacles that occur at various stages of weight loss. Phase one addresses the instruction of behavioral components (e.g., caloric restriction) and psychological components (e.g., motivation). Weight loss and preparation for weight maintenance occurs during phase one with an emphasis on acceptance and realistic goal setting. Phase two focuses on behavioral components of monitoring weight, but also cognitive flexibility in regards to eating guidelines, and instilling the belief that the individual can achieve set goals.

In another approach that served to improve the weight loss efforts of participants, Forman, Butryn, Hoffman, and Herbert (2009) incorporated acceptance-based therapy into a behavioral weight loss structure. While the behavioral component focused on monitoring and reducing caloric intake to create a less triggering food environment, the acceptance-based components revolved around distress tolerance, mindfulness and commitment enhancement.

Desired physiological and psychological effects were found, such that, participants lost an average of 9.6% body weight by six-month follow up, in addition to an increased quality of life.

Dalen et al., (2010) utilized a mindfulness-based approach to aid dieters in their efforts. Ten obese adults participated in a mindfulness training protocol in the form of weekly group classes for six weeks. The focus of the program was on using mindfulness techniques (primarily mediation), in order to examine internal cues to guide eating behaviors. Primary findings included significant weight loss at both six-week and 12-week follow-ups, accompanied by significant decreases in reported levels of loss of control over eating. Furthermore, participants significantly increased their mindfulness skills as shown by significant results at both six weeks and 12 weeks on all four mindfulness subscales (Observe, Accept, Awareness, Describe, Cooper & Fairburn, 2001; Dalen et al. 2010; Forman et al., 2009). The uses of cognitive mechanisms in weight loss programs that have been demonstrated to increase weight loss success demonstrate the necessity of cognitive engagement in order for successful dieting to occur.

Preoccupying thoughts and dieting

Dieting is a complex process that requires constant self-monitoring and has subsequent impact on an individuals' body image (Ackard et al., 2002; Burke, Wang, & Sevick, 2011). Weight monitoring behaviors are a core feature of weight loss programs and efforts (Cooper & Fairburn, 2001; Dalen et al., 2010; Forman et al., 2009). Weight monitoring (e.g., self-weighing) is a particular form of self-regulation that allows one to examine eating and physical activity patterns in relation to one's weight and then make appropriate behavioral changes. Weight monitoring has been shown to be particularly important for successful dieting. Burtyn, Phelan, Hill, and Wing (2007) used the National Weight Control Registry to investigate dieting

behaviors and found that weight gain was associated with a decrease in self-weighing, even when other weight control variables were held constant. Participants who decreased self-weighing also reported increased caloric consumption.

In order for dieters to be successful, they must be aware of the impact of their behaviors on their weight (i.e., individuals must exert cognitive effort towards controlling their behavior). Self-monitoring, therefore, translates into a conscious effort to control one's weight. Self-monitoring can be linked to a preoccupation with weight monitoring behaviors (i.e., self-weighing) in order to achieve dieting success. Other dieting behaviors such as caloric tracking and increasing physical activity also require conscious effort. Wing and Hill (2001) examined the role of both planned exercise and lifestyle physical activity (e.g., taking the stairs) as dieting behaviors, finding that participants increased both types of exercise while dieting to lose and dieting to maintain. It is logical to assert that, in order to reach weight loss goals, one must have a preoccupation with said goals. Hence, weight preoccupied women are synonymous with frequent dieters, and weight preoccupation is a characteristic of dieting (Garner, Olmsted, Polivy, & Garfinkel, 1984; Striegel-Moore et al., 1986).

The literature on restrained eating also provides evidence for the notion that preoccupying cognitions in dieters are prevalent. It is important to note that conceptualization of restrained eaters is defined, not in terms of weight suppression success, but rather the cognitive effort exerted to control one's eating (Lowe, 1993). Therefore, the cognitive restraint exhibited by dieters requires monitoring of the environment and internal cues, creating a cycle of preoccupying thoughts surrounding one's body and eating behaviors.

Firstly, restrained eaters constantly implement their own rules to control their dietary

intake. A prominent feature of being a restrained eater is increased sensitivity and responding to external food cues, making weight loss goals difficult to achieve (Fedoroff, Polivy, & Herman, 1997). However, some restrained dieters are successful in losing weight. Further support for the existence of preoccupying cognitions in dieters can be observed from studies examining self-regulation in restrained eaters. Papies, Stroebe, and Aarts (2008) examined how successful and unsuccessful restrained eaters differed in self-regulation across two studies. In study one, the impact of palatable food primes on the accessibility of the dieting goal was tested. Participants had the task of determining if the words presented to them through a computer program were real words or not. Critical trials consisted of a food prime, followed by varying letters, then a diet word. Reaction time was used as a measure of accessibility of the dieting goal. Successful restrained eaters responded significantly faster than unsuccessful restrained dieters when diet words were primed with a food word (i.e., chocolate).

These findings indicate that goal accessibility may act as a cognitive mechanism, which moderates the success (or failure) of restrained dieters. Most importantly, this mechanism would require conscious effort on the part of dieters and non-dieters. In order to be successful, restrained eaters must quickly make an association between palatable foods and their weight loss goal, implying preoccupation with food, shape, and weight.

A Culture of Preoccupation: Evidence from "Pro-Ana" Websites

While dieters clearly exhibit a preoccupation with food, weight, and shape, pro-anorexia websites demonstrate the cultural preoccupation with thinness. Pro-anorexia ("pro-ana") websites promote thin ideals through positive portrayals of thin women, negative portrayals of over-weight women, and motivation for losing weight. Such websites are increasing in frequency, and have become increasingly interactive by providing weight loss tips, support,

friendship and community. In order to be seen as a valid member of the pro-ana community, members participate in-group rituals including: reporting weigh-ins, posting food logs, and pictures of oneself (Boepple & Thompson, 2016; Boero & Pascoe, 2012).

Traditionally, self-starvation and thinness has been analyzed using a moral framework (see Eckermann, 1997 and Vandereycken, & Van Deth, 1994 for a review). In this framework, thinness is seen as a positively sacred ideal and is defaced by fatness. Pro-ana website members boast the amount of self-control and discipline needed to participate in such a lifestyle. Members valuing the thin ideal conceptualize the behaviors as attributes that make them attractive and accomplished (Boero & Pascoe, 2012).

"Fitspiration" websites are another example of American culture's obsession with thinness. Fitspiration websites claim to promote fitness lifestyles, but host content that portrays fit and toned women positively, place obsessive emphasis on exercise, and induce guilt about one's body shape. Boepple and Thompson (2016) performed a content analysis of pro-ana and fitspiration websites. It was uncovered that both sites contained the same amount of fat and weight stigmatization, objectifying messages, and guilt inducing messages about body shape, and content on dietary restraint.

However, pro-ana websites contained more content related to losing fat/weight, images of women posing to appear thinner, and guilt inducing messages about food (Boepple & Thompson, 2016). This is particularly concerning as other research has found exposure to such images has a harmful impact on body image and relationship to food variables (Cattarin, Thompson, Thomas, & Williams, 2000; Homan, 2010; Sabiston & Chandler, 2009).

Weight loss camps serve as somewhat of a foil to pro-ana websites. Weight loss camps

implement cognitive strategies to initiate and maintain behavior changes, improve self –esteem, self-confidence, and self-image. The camp environment is focused on creating a safe and sociable environment that teaches skills needed for weight loss and physical activity. Barton, Walker, Lambert, Gately and Hill (2004) employed a sentence completion methodology to examine thoughts and beliefs regarding exercise, eating, and appearance of adolescents during attendance of a weight loss camp. In this study, 61 adolescents completed the Sentence Completion Test for Eating and Exercise (SCEE), and The Self Perception Profile for Children. The SCEE measured automatic thoughts and conditional beliefs by having participants complete a sentence stem regarding exercise, eating, and body appearance. This allowed researchers to code automatic thoughts as negative, positive, or neutral and conditional beliefs as dysfunctional, functional, or neutral. Throughout the progress of the camp, researchers observed a reduction in the number of negative automatic thoughts and an increase in positive automatic thoughts (Barton et al., 2004).

However, researchers noted that, "there was no change in the number of dysfunctional or functional beliefs (p. 316)." This finding has particular relevance to the dieting and cognition literature. While automatic thoughts represent a general self-perception, conditional beliefs measure a how the individual processes information relating to the self by using hypothetical situations. Therefore, even though participants' self-worth and image increased, there was an observed persistence in the preoccupying thoughts that dieting induces. As such, while affect may be changing, participants were still interpreting information about themselves by using weight as a central construct. Researchers explained this finding by examining the concept of self-schemata (Barton et al., 2004).

Preoccupying Thoughts as Self-Schemata

Self-schemata are cognitive self-generalizations, particularly in terms of social interactions. Acting like a filter, self-schemata provide a way for individuals to determine what information to attend to, and the attributes of subsequent situational appraisals, hence, providing a base for judgments, decisions, inferences, or predictions about the self (Markus, 1977). The formation of these preoccupations could be the result of one's interpretation of certain experiences regarding weight, shape, or food, thus, leading to the creation of certain cognitive associations (Reed, 1968). While dieting may improve certain aspects of self-reflection overall, the thoughts concerning food, body shape, weight, and exercise are likely to still persist in terms of interpretations about the self in certain situations.

This persistence of diet, weight, shape, and food related thoughts provides evidence that these concepts are part of individual's self-schemata. Morris, Goldsmith, Roll, and Smith (2001) empirically investigated the ways in which food and weight concerns influence self-worth in high and low restraint eaters by constructing a "schema map." A word association technique was used to create a web of diet, food, weight, and shape related constructs. Individuals then judged the relatedness of concepts and algorithms then produced centrality and cluster ratings. Overall, there was a significant difference in the way high and low restraint participants rated the concepts. High restraint participants had greater centrality of weight/food-related concepts and demonstrated a greater association between self-evaluative and weight/food-related concepts.

Furthermore, dieting is often linked to associations about the self. McFarlane, Polivy, and Herman (1998) examined the effect of giving false weight feedback to restrained and unrestrained eaters. Participants were classified as restrained or unrestrained eaters, then randomly assigned to be given their actual weight, a weight five pounds heavier, or a weight five pounds lighter than their actual weight. Immediately after weighing in, participants completed

affect ratings, a "perceptual taste test" of cookies, and then completed body shape measures. Restrained eaters who were told they were five pounds heavier scored lower on total appearance, and social self-esteem measures than those in the control conditions. Restrained eaters also felt significantly more negative emotions when they were told they gained five pounds; unrestrained eaters showed no change in mood. Behaviorally, restrained eaters who were told they gained five pounds ate significantly more of the cookies than any of the other groups, which is in line with previous findings (see Rotenberg, & Flood, 1999 for a review; Ruderman, 1985) that negative affect leads to disinhibition of restraint eaters.

Barton et al., (2004) demonstrated a consequence of dieting that potentially may impact dieters' cognitive ability, as it has been shown that various cognitive domains suffer simply as the result of choosing to be on diet (Markus, 1977). Weight preoccupation therefore appears to be characteristic of dieting (Garner, Olmsted, Polivy, & Garfinkel, 1984; King, Herman, Polivy, 1987; Striegel-Moore et al., 1986).

Preoccupying Thoughts and Executive Function

Preoccupying or worrisome thoughts can also be conceptualized as negative intrusive thoughts, and dwelling on potential future events (Borkovec, Robinson, Pruzinsky, & DePree, 1983). Hayes and Hirsch (2008) sought to investigate the effect of worrisome thoughts on working memory. The Penn State Worry Questionnaire was used to place participants into a high-worry group and a low-worry group. Participants were given the main task of thinking about either a personally worrisome or positive topic, while pressing a random keyboard letter every time they heard a beep. If worrisome thoughts taxed working memory, the letter sequences in the worrisome condition should be less random than the sequences in the positive condition.

Results from this study demonstrated that the existence of worrisome thoughts impaired working memory. Both the high-worry and low-worry group saw a reduction in random letter generation when engaging in worry. The high-worry group was significantly less random in both the worry condition and the positive condition, as was expected given their increased tendency to worry. Both results remained significant even when accounting for depression, anxiety, and happiness.

Therefore, the nature of worry demands attentional resources that are shared with working memory components. This raises the question of determining what forms of worry people are engaging in. Researchers did not specify what type of worry participants should engage in (i.e., verbal or mental imagery); therefore, it is impossible to draw specific conclusions regarding what component of worry effects working memory.

It is possible that dieting status raises concerns within the individual that manifest as verbal thoughts. Dieting concerns may increase engagement in self-talk, or verbal preoccupying cognitions. Leigh and Hirsch (2010) conducted a follow up study on the effect worry had on residual working memory capacity, and improved upon previous research by examining both verbal and imagery forms of worry. Participants were categorized into either a high or low worry group, and then performed a working memory task that consisted of randomly generating letters while either engaging in verbal or mental imagery forms of worry. Researchers found that condition (imagery or verbal) had an effect on randomness. Specifically, those in the high worry group generated less random combinations of letters for the verbal condition, but not the imagery condition. While controlling for the degree and negativity of worry, as well as attentional control, condition and group still remained significant. In other words, preoccupying worries in the verbal form impacted working memory function.

Preoccupying thoughts may increase one's cognitive load and thereby produce deficits in one's performance on cognitive tasks. Cognitive load can be thought of as a representation of the strain or resources that a particular task requires of an individual's limited cognitive system (Paas & van Merriënboer, 1994). Boon, and colleagues (2002) sought to investigate differences in caloric consumption between restrained and unrestrained eaters under cognitive load. Participants were first divided into a restrained or non-restrained group using the Restraint Scale (Polivy, Herman, & Howard, 1988). Participants were then randomized into conditions of eating low calorie or high calorie ice cream in the presence of a distraction or no distraction. The manipulation of caloric perception was used because restrained eaters should, by definition, seek to avoid high caloric foods. Cognitive load was induced via a distraction manipulation, which was implemented by playing a radio conversation for participants and telling them that they would be asked about the conversation later. Researchers proposed that the effect of cognitive load in restrained eaters should be especially pronounced in the high calorie condition because under non-cognitive load conditions, the restraint needed to avoid high calorie foods is high. If cognitive load effects the restrained dieters' ability to monitor their dieting goals, then restrained dieters should consume more ice cream in the distraction condition where they are under more cognitive load. Results were in line with the hypothesis that restrained eaters would eat significantly more than unrestrained eaters in the distraction condition (Boon, et al., 2002).

There is evidence that suggests preoccupying thoughts are present in dieters and that they may effect cognitive performance (Green & Rogers, 1998; Jones & Rogers, 2003; Vreugdenburg, Bryan, & Kemps, 2003). Jones and Rogers (2003) investigated two hypotheses of observed cognitive deficits in dieters: 1.) the deficit is due to metabolic consequences, and 2.) the deficit is psychological in origin by administering cognitive batteries before and after

consumption of a chocolate bar. Researchers hypothesized that the consumption of a chocolate bar would induce persistent and distracting thoughts due to its high caloric value in dieters as opposed to non-dieters, while simultaneously restoring theoretically low glucose stores.

Participants were required to consume a chocolate bar. After consuming the chocolate participants completed mood, and restraint, self-reports, as well as reaction time, visual processing and immediate memory tasks. Finally, participants were interviewed about thoughts and feelings that arose during testing. Dieters scored significantly lower than non-dieters on the memory task after consumption of chocolate. Non-significant differences between dieters and non-dieters on the reaction time measure demonstrated that differences could not be attributed to slowing of motor response. In addition, dieters reported more food, dieting, and guilt related thoughts during the task after chocolate consumption. These results are particularly noteworthy, as they support preoccupying thoughts as a mechanism for impaired memory performance and significance emerged even under a small sample size (n = 39).

Green and Rogers (1995) examined the notion that dieting status effects cognitive performance by examining the performance of female dieters on a battery of neuropsychology tests. For this study, participants were first randomly split into three groups: dieting on the first session but not on the second (YN), not dieting on the first session but dieting on the second (NY), and dieting on both sessions (YY). Participants were given an initial test to determine their baseline, and then tested again three weeks later. During both sessions, participants were four administered tasks: sustained attention, simple reaction time, and immediate free recall.

While the groups did not differ on BMI, Eating Attitudes Test, Beck Depression Inventory, or Trait/State Anxiety scores, analyses detected a significant interaction between dieting status and session. When the performance of participants on a dieting week to a non-

dieting week was compared, it was found that performance on the sustained attention, reaction time, and recall tasks were impaired during the dieting sessions. As performance was impaired in the NY group, it was concluded that poor performance on the task could not be attributed to task novelty. Each task required an attentional component, making distractibility a plausible a mechanism by which dieting exerts cognitive deficits.

In addition to effects of dieting found by Green and Rogers (1995), Anci, Watts, Kanarek and Taylor (2008) similarly observed effects of dieting on memory span, but found ambiguous results for visuospatial ability. Anci and colleagues (2008) examined low-carbohydrate and caloric restriction diets on cognitive performance measures of visuospatial memory, vigilance attention, and memory span. While groups did not differ on BMI or amount of weight lost, differences emerged for memory span and visuospatial memory tasks. The caloric restriction group recalled more digits than the low carbohydrate group in the complex version of the memory span task. Participants were also given a visuospatial memory task, which consisted of five fictional maps containing 24 countries with names that fit a theme. Participants were then asked to fill in a blank outline of the map. After one week, short-term recall revealed an effect of low carbohydrate dieting, such that those in the low carbohydrate group placed fewer items correctly when compared to the caloric restriction group. Furthermore, when examining long-term recall, low carbohydrate participants used more made-up responses when compared to the caloric restriction group, but also left fewer responses blank.

This study is not without limitation. Firstly, the sample size was small (n=19), which limits the generalizability of the study. Additionally, both diets adopted by participants were structured. The low carbohydrate diet was structured similarly to the Atkins Diet and the reduced caloric diet was provided by the American Dietetic Association guidelines. The structured diets

may have confounded the negative cognitive effects of dieting, as other studies have not required participants to follow a specific plan and instead allow participants to self-select what type of diet to use (Green & Rogers, 1995). A short duration structured diet may confound results when compared to spontaneous or chronic dieters because guidelines may reduce the cognitive load of the participant. Furthermore, as participants were not randomized into groups, a biased effect from self-selection is possible.

Overall, results of visuospatial memory tasks have been less consistent and more ambiguous than results of phonological memory measures, suggesting that preoccupying thoughts effect dieters in primarily a verbal domain (Green & Rogers, 1998; Hayes & Hirsch, 2010). There is ambiguity in the literature regarding the conditions that produce cognitive deficits observed in dieters. Of particular debate, is how working memory is affected by dieting (Bryan & Tiggemann, 2001; Green & Rogers, 1998).

Working Memory: The Dieter's Primary Deficit

Working memory specifically concerns itself with the manipulation of information for the performance of cognitive tasks. Specifically, working memory is a system consisting of individual components, which interact, and are coordinated by a single overarching component. The central executive allots attentional control processes and strategies to the two subsystems: the articulatory loop and the visuo-spatial sketchpad. The articulatory loop is, broadly speaking, a subvocal rehearsal system (Badley, 1983).

The articulatory loop is comprised of a phonological input store and an articulatory rehearsal process (i.e., 'self-talk'), and is primarily concerned with verbal memory. Evidence for subvocal self-talk can be observed through both the word length effect and the unattended speech

effect (Badley, 1983; Baddeley, Thomson, & Buchanan, 1975). When participants are asked to remember words, memory span decreases for multiple syllable words (e.g., university) as opposed to monosyllable words (e.g., sum); as the span for words shorter in spoken duration is longer than that of words longer in spoken duration. Additionally, as observed in the unattended speech effect, when participants are instructed to remember visually presented stimuli, memory can be interrupted by the simultaneous presentation of speech (Badley, 1983). Working memory has been a primary concern of the dieting and cognition literature as evidence indicates this system is significantly affected by the act of dieting (Green & Rogers, 1998).

Green and Rogers (1998) investigated the impact dieting has on working memory, and demonstrated specific deficits in the central executive and articulatory loop of women who are specifically dieting to lose weight. In this study, 71 female subjects were recruited from a University in the United Kingdom and given the restraint subscale of the Dutch Eating Disorder Questionnaire. Researchers used this scale to categorize participants into low/medium restraint eaters, high restraint eaters, or current dieters. During sessions of neuropsychological testing, participants were asked to perform a mental rotation task, a phonological similarity task, and the tower of London task to examine the visuospatial sketchpad, phonological loop, and central executive, respectively. Cognitive performance differences in the two non-dieting groups and the dieting group were found such that dieting individuals recalled fewer correct letter sequences than the non-dieting (low/medium restrain and high restrain) groups.

Additionally, for the mental rotation task, it was found that the larger the angle of rotation, the longer the time it took for the participants to come to a conclusion. However, there was no significant difference found between subject groups. In other words, there existed no significant difference in visuospatial working memory performance between the dieting group,

and the non-dieting group. Taken together, this implies that dieting impairs the phonological loop, but does not appear to interfere with visuospatial abilities.

Green, Elliman, and Kretsch (2005) also have found evidence of preoccupying cognitions as a mediator of working memory. Green, Eilliman and Kretch (2005) randomly assigned women to one of three groups: non-dieting, dieting without group support, and dieting with a weight loss group. The main hypothesis of this study sought to investigate working memory impairments in supported and unsupported dieters while examining cortisol levels. Using measures to assess phonological, visuospatial, and central executive components of memory respectively, researchers found differences in both group performance and cortisol levels.

Phonological working memory performance was impaired in the unsupported dieters, with fewer words being recalled at one week. Furthermore, the unsupported dieting group's recall was lowest at one week than at any other point, and worse than the other groups at any time point. A difference in performance of the Tower of London, a central measure of central executive capacity, was observed. Performance on the Tower of London showed slower planning times for difficult problems in the unsupported dieting group. In agreement with previous studies (Green & Rogers, 1998), visuospatial impairment was not found, as measured by the mental rotation in which participants must use visual representations to rotate one shape to decide if it is the same or different than the figure next to it.

The lack of differences between groups that emerged for the visuospatial domain may be explained, at least in part, by the notion that anxiety surrounding dieting manifests as verbal preoccupying cognitions. Further support for the effect of preoccupying cognitions can be observed by the differences in perceived support. In summary, non-supported dieters were

significantly vulnerable to neuropsychological impairments and showed increased cortisol levels in the initial week of dieting, whereas supported dieters seem to escape this effect. This is presumably because of the extent to which social support contributed to levels of preoccupying cognitions (Eysenck & Calvo, 1992; Green & Rogers, 1998)

Vreugdenburg, Bryan, and Kemps (2003) expanded on research by Green and Rogers (1998) by utilizing groups of current dieters and non-dieters to investigate working memory in relation to preoccupying cognitions. As mentioned previously (Barton et al., 2004), levels of preoccupying cognitions may mediate the effect dieting has on one's cognitive functioning. Vrenugdenburg and colleagues' study directly assessed preoccupying cognitions in relation to working memory status of dieters, while also helping to clarify earlier work done by Green and Rogers (1998). Participants completed demographic and background information, four working memory tasks, and a preoccupying cognitions measure that had been developed in a pilot study for this project. The four working memory assessments were utilized in a dual-task paradigm of which mental arithmetic was the primary measure and secondary measures included articulatory suppression, spatial tapping, and random generation. Finally, the phonological similarity effect task and word length effect task were employed to examine phonological loop function and articulatory control, respectively.

Findings indicated that dieters and non-dieters differed in several domains, specifically, dieters recalled fewer letter strings on the Phonological Similarity Effect Task in both the visual and auditory modalities (Vreugdenburg et al., 2003). Furthermore, an ANOVA that assessed diet condition and time latency revealed significant differences between groups in the articulatory suppression and random generated tasks. However, the aspect of this study most relevant to the current hypothesis was the finding that preoccupying cognitions accounted for the most variance

due to dieting status. Specifically, preoccupying cognitions accounted for 96% of the variance due to dieting status in the visual presentation of the Phonological Similarity Effect Task.

In general, this study provides support for the notion that simply being on a diet impacts working memory, as demonstrated by the time latency and error findings on tasks targeting the phonological loop and central executive. The argument for general cognitive ability impairment, while a valid concern, seems to be guarded against by the lack of significant differences on the Matrix Reasoning Task. Therefore, it cannot be concluded that the deficit in working memory observed in dieters results from a lack of general intelligence. The high percentage of variance accounted for by preoccupying cognitions provides insight into a mechanism by which dieting affects the phonological loop and central executive. However, a small sample size warrants caution in interpretation and calls for further investigation. Furthermore, this study was one of the only known studies that utilized a measure of preoccupying cognitions; therefore, it is reasonable to raise concerns regarding construct validity and reliability.

Rationale for the Current Study

The main purpose of this study is to develop a better understanding of the ways in which preoccupation with food, shape, weight, and appearance interact with cognitive performance, specifically working memory. The study is a factorial design with two factors: dieting status and preoccupying cognitions (low vs. high, Overduin, Jansen, & Louwerse, 1995; Vreugdenburg, Bryan & Kemps, 2003). The primary dependent variables are the scores on the articulatory loop task, visuospatial sketchpad task, and central executive task. Furthermore, this study seeks to improve upon previous literature by using more robust measures of preoccupation, taking into consideration general neuropsychological performance, and using tasks designed to specifically

target the phonological loop, articulatory rehearsal process, and the visuospatial sketchpad. To the author's knowledge, only one previous study assessing preoccupying thoughts among dieters measured general intelligence (Vreugdenburg, Bryan, & Kemps, 2003) and none included a general neuropsychological testing battery. The current study takes into consideration that it is possible for preexisting differences in intelligence and neuropsychological functioning to exist between dieters and non-dieters.

It is expected that participants who endorse dieting will demonstrate the highest levels of preoccupation with weight, shape, food, and diet related constructs. Secondly, it is expected that all participants will show average general neuropsychological functioning as measured by the Repeatable Battery for the Assessment of Neuropsychological Status (Randolph, 1998). As it has been previously demonstrated that preoccupying cognitions appear to predominantly exist in a verbal form, it is hypothesized that preoccupying thoughts will result in the greatest deficit in the articulatory loop (Green & Rogers, 1998; Vreugdenburg et al., 2003). The effect of preoccupying thoughts on the articulatory loop is anticipated to be significant in the high restraint group as opposed to the low/medium restraint group. A two-way interaction of dieting status and level of preoccupation is expected such that high restraint eaters with high levels of preoccupation will score the lowest on the articulatory loop measures compared to the low/medium restraint groups with low levels of preoccupation.

The relationships among individual variables, such as levels of anxiety, obsessive-compulsive tendencies, and worry, will be explored and potentially used as covariates. Anxiety, obsessive-compulsive tendencies, and worry symptomologies have been shown to exert effects that are similar to that of preoccupying cognitions, such as often being intrusive and persistent, , as well as occurring in a form of subvocalization (Eysenck & Calvo, 1992; Hayes & Hirsch, 2008).

Chapter II

Method

Participants

Participants will be recruited from the University of North Dakota, as well as the surrounding community, primarily through the use of flyers. Participants were recruited using the Sona systems, as well as flyers placed in Grand Forks. Sona systems is an online participant recruitment system that recruits students from the University of North Dakota. Participants will receive extra class credit for their participation in the study. The questionnaires will be presented on the Qualtrics website. Qualtrics is a survey building system that allows the researcher to randomize the order as to which the questionnaires are presented.

Participants are required to 18 years old or older. Exclusion criterion for participants includes: a history of psychiatric disorders and concussions with loss of consciousness. An *a priori* power analysis using G*Power for *F* tests, with alpha set to .05 and power set to .8, was conducted in order to determine that a sample size of 158 female participants would be necessary to detect a small to medium effect size (Faul, Erdfelder, Lang, & Buchner, 2007, 2009). Female participants will be used exclusively as dieting frequently presents differently in males, with women typically endorsing a greater drive for thinness (Anderson & Bulik, 2004). In addition, the literature regarding preoccupying cognitions as a mechanism for cognitive deficits in dieters is fairly new, making it important for research to be replicated and thoroughly expanded before investigating the presentation in a separate population.

UND Psychology participants are eligible to earn course credit in participating Psychology classes for their participation, or they can choose to be entered in a raffle for an Amazon gift card worth $20.00. Students participating for course credit will be granted 2 course credit units in participating psychology courses in which they are enrolled through Sona Systems. Students participating for an Amazon gift card will provide an e-mail address to be entered into a random drawing for the gift cards. Community members will also provide an e-mail address to be used to enter them into a random drawing for Amazon gift cards. When recruitment ends the drawing for the Amazon gift cards will take place.

Materials

demographic questionnaire. Participants will be administered a questionnaire online to assess age, race, education level, occupation/major in school, marital status, and dieting behaviors. The dieting behaviors section will ask participants to explain any special diets they are currently on (e.g, low carbohydrate, low fat, gluten free) and why (e.g., to lose weight, maintain weight, gain weight, medical reasons). BMI will be calculated by utilizing the ratio of weight (kg) to height in (m) squared. Weight and height will be recorded with a standard scale in lab.

Eating Disorder Inventory (EDI). The EDI (Garner, Olmstead, & Polivy, 1983) is a 64 item self-report measure assessing psychological and behavioral traits common in anorexia nervosa and bulimia nervosa. Participants will respond to questions on a six point forced choice Likert-type scale ranging from “always,” to “never.” The EDI consists of 8 subscales: Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fear. The scale has an internal consistency, Cronbach’s Alpha of .63.

Dutch Eating Behavior Questionnaire. (The Dutch Eating and Behavior Questionnaire (DEBQ, Van Strien et al., 1986) is made up of three subscales, including Restrained Eating, Emotional Eating, and External Eating Behaviors. The first two dimensions of the DEBQ examine how people sometimes eat to suppress emotions. The other dimension measures emotional eating. The scale for each question was the same based on a Likert-scale, with choices ranging from: never (1), to very often (5). Participants based their answers off of their eating behavior and thoughts coinciding with eating. A non-relevant response category was added to each subscale to account for the subjects that never experience a particular emotion, do not eat too much, or never become heavier. For this particular study, the restraint subscale was utilized, as dieting has been associated with high levels of dietary restraint. Higher scores represent higher levels of restraint.

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). The RBANS (RBANS; Randolph, 1998) is a test that can be administered individually to measure attention, language, visuospatial/constructional abilities, and immediate and delayed memory. Consisting of 12 subtests with alternate forms, the RBANS takes 30 minutes to administer and reduces practice effects. It is important to utilize a general neuropsychological battery is because individual differences may exist since the individuals are choosing to categorize themselves in certain groups.

Preoccupying cognitions. A measure of preoccupying cognitions was developed and then tested in a pilot by Vreugdenburg, Bryan and Kemps (2003). The scale consists of 20 statements regarding participants' experiences surrounding thoughts about food and body shape over the past month. Responses are recorded with a six-point Likert type scale consisting of 1 (never) to 6 (always), with higher scores reflecting higher levels of preoccupation. The measure

had strong internal reliability and the subscales also had strong internal reliability according to a pilot study conducted by Vreugdenburg et al., (2003).

Sentence Completion Test for Eating and Exercise (SCEE). The SCEE (Lipsey, Barton, Hulley, & Hill, 2006) is a 24-item cognitive measure that presents participants with sentence stems to elicit automatic thoughts and conditional beliefs related to exercise, eating behavior, and body appearance. Participants are instructed to write the first word that comes to mind after the sentence stem, and are free to expand upon that word if they so choose. The test is comprised of 12 stems for automatic thoughts, and 12 stems for conditional beliefs by using an "if-then" structure. A coding manual will then be used to sort the automatic thought responses into negative, positive, and neutral; the conditional beliefs are sorted into dysfunctional, functional or neutral.

The State Trait Anxiety Inventory (STAI). The State Trait Anxiety Inventory (STAI) is a 20-item state and 20-item trait anxiety self-report questionnaire. Participants rate items on a four-point scale going from 1 ("Almost Never") to 4 ("Almost Always"), with higher scores indicating greater levels of anxiety. The scale is particularly useful in distinguishing anxiety from depressive symptomology, and the scale has internal consistency ranging from .86 to .95 (Abbassi, 1998; Spielberge, 1969; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983).

Beck Depression Inventory. The Beck Depression Inventory (BDI) is a self-report measure that assesses attitudes and symptomology relating to depression. The 21-items appear in a multiple-choice format with the aim of targeting specific attitudes and symptoms pertaining to depression. The BDI has a strong internal consistency for non-clinical samples (.81, Beck, Ward, Mendelson, Mock, & Erbaugh, 1961).

Phonological Similarity Effect Task. Participants will listen to computer generated recordings of lists of words, with two practice rounds each consisting of 12 letter strings preceding the actual task. During the actual task, participants will be randomly presented with one of two lists, one with five letters that are either phonologically similar (C, P, T, D, G) or one with letters that are phonologically dissimilar (H, M, J, R, Z). Once the string is complete, participants will be asked to recall and write down the letters in the order they were presented. The lists will be read at a rate of .5 seconds, and total presentation time will be 2.5 seconds. Participants will randomly perform one of the lists under articulatory suppression by repeating the word "the" while listening to the list. The number of letter strings correct will determine the participant's score for each of the four conditions: confusable and non-confusable letters under suppression and no suppression (Adapted from Shaw & Tiggemann, 2004).

Word Length Effect Task. This task is designed to investigate the functioning of the articulatory control process. Participants are presented with two lists of five words for 10 sets. The words are presented at a rate of 1.5 seconds and once the list is complete, participants are given a 20 second interval to write down the words in the same order that they had appeared. One list is comprised of short words (e.g.: book) and the other is comprised of long words (i.e. hippopotamus). The order in which participants receive the lists and words will be counterbalanced. Correctly reproduced word sequences will receive a score of one. Any errors will lead to a score of zero. Participants will perform one of the lists under articulatory suppression by repeating the word "the." Performance will be scored as the number of correct trials (all five words in order) out of a possible five for each of the four conditions: short and long words with and without suppression. (Adapted from Shaw & Tiggemann, 2004).

Visuospatial Sketchpad. Rey-Osterrieth. The RBANS contains a complex figure task, similar to that of the Rey-Osterrieth Complex Figure. First, the participant is presented with the figure and asked to make an exact replica of the picture. After administration of other tasks in the RBANS, the participant is (unknowingly to them) asked to replicate the figure from memory. The correlation between performance on the Rey and the RBANS figure task are .79, making the RBANS figure task a strong measure of visuospatial ability.

Mental Rotation Task. Mental Rotation Tasks require participants to imagine what a key stimulus will look like when it is rotated to varying degrees. Participants will be required to match a key stimulus to rotated options, which will be provided. The participant will score points by choosing the correct rotation of the object; reaction time will also be recorded. This task is a measure of visuospatial working memory.

Random Generation. Participants will be asked to randomly generate numbers between one and 10 out loud. Participants are encouraged to perform the tasks at a rate of one number per second and avoid stereotypical sequences (e.g., 2, 4, 6, 8). Degree of randomness is assessed by entering responses into a computer program, and producing a score between 0 (completely random) to 1 (not random) (RgCalc, Towse & Neil, 1998; Evans, 1978).

Obsessive Compulsive Inventory – Revised Short Form. The Obsessive Compulsive Inventory (OCI-R; Foa, Huppert, Leiberg, Langner, Kichic, Hajcak, & Salkovskis, 2002) is an 18-item self-report measure that can be used as a screening tool for Obsessive Compulsive Disorder (OCD). Participants are asked to rate statements on a four-point scale going from 0 (“Not at All”) to 4 (“Extremely”), with higher scores indicating greater levels of distress and bother. An example statement is “I check things more often than necessary” (Huppert et al., 2002)

The scale loads on six factors with the subscales being moderately correlated to each other (.31 to .57) and correlations between subscales and total scale score range from moderate to high (.63 to .80; Huppert et al., 2002).

Procedure

This study employs a 4 (Dieting status) X 2 (Preoccupation: high, low) between subjects design. Informed consent will be obtained then participants will complete the demographic questionnaire, DEBQ, STAI, EDI, preoccupying cognitions scale, and BDI through Qualtrics Research Suite from April 2017 to March 2018. The order of this administration will be random. The RBANS, SCEE, and working memory tasks will be administered by trained research assistants in a predetermined randomized order.

formation of groups for analysis.

Timko and colleagues (2006) explain that developing a standard operationalized definition of dieting is difficult, given the various ways individuals interpret what it is to "diet." For instance, some individuals may be "watching their weight" or "eating healthy," and see these as preemptive measures – not as being on a diet. However, evidence exists which shows that individuals who consider themselves as "watching their weight" or "controlling their weight" engage in many of the same behaviors as self-reported dieters. Given the ambiguity of asking individuals, "Are you currently on a diet" we followed up this question with "Are you currently trying to lose weight/maintain weight/not trying to do anything about weight." This is important because Timko et. al., (2006) reported that women dieting to lose weight engaged a wider variety of weight loss behaviors than those engaged in dieting to maintain weight. As such, classifying

dieters on their self-identified dieting status, as well as a clarifying question helps ensure validity.

Additionally, to ensure validity of dieting status, we asked participants to report their dieting behaviors. Asking participants to report their dieting behaviors served as a "manipulation check" to ensure that reported dieters were actually engaging in the behaviors associated with dieting, and did not just identify as a dieter because they had the intent to engage in dieting behaviors (Timko, Perone, & Crossfield, 2006). Further, from a self-monitoring framework, individuals who are trying to lose weight should engage in a greater number of dieting behaviors, compared to individuals trying to maintain and individuals who are not trying to do anything about their weight. Given the self-monitoring framework of which this study is grounded, individuals who have more behaviors to keep track of, should, hypothetically, be more preoccupied with food/shape/weight, and show deficits in verbal working memory performance due to the demand these subvocal thoughts place on the articulatory loop.

In order to gain a more accurate perception of dieting behaviors and form the dieting groups to use for analysis, participants were asked two questions: "Are you currently on a diet" (yes/no), and "Are you currently trying to" (lose weight/maintain weight/not trying to do anything about weight"). In order to gain a deeper understanding of the participants' perceptions of dieting, and dieting status, four groups were created. Group 1 (N = 36) consisted of individuals who reported being on a diet, and indicated they were dieting to lose weight. Group 2 (N = 34) consisted of individuals who reported not being on a dieting, but that they were dieting to lose weight. Group 3 (N = 18) consisted of individuals who reported not currently being on a diet, but reported dieting to maintain weight.

Group 4 (N = 15) consisted of individuals who reported not currently being on a diet, and not trying to do anything about their weight. The sample had a total N of 103 at the time of analysis.

CHAPTER III

ANALYSIS PLAN

A Pearson correlation will be conducted on all of the dependent variables (RBANS, SCEE, STAI, BDI, Phonological Similarity Effect Task, Word Length Effect Task, Rey-Osterrieth, Mental Rotation Task, Random Generation, OCI-R) to examine the relationship between items. Analyses will be run to test for differences in general neuropsychological functioning, order effects, and demographic differences. Data will then be analyzed using a series of 4 (Dieting status) X 2 (Preoccupation: high, low) factorial ANOVAs. All combinations of the independent variables will be conducted. Post-hoc tests will be conducted as needed. Tukey will be used as the post-hoc test for data meeting the assumption of homogeneity of variance, and Games-Howell will be used as the post-hoc test when the assumption of homogeneity of variance is violated. Games–Howell is accurate when sample sizes are unequal, and it is likely that given way the groups are formed, that cells will be unequal (Field, 2009).

CHAPTER IV

PREDICTIONS

It is expected that groups will not differ based on demographic information, or general neuropsychological variables as measured by the RBANS. This will be measured by a 4x2 factorial analysis of variance ($p>.05$).

A 4 (dieting status) x 2 (preoccupation) is expected to yield a main effect of dieting status and preoccupying thoughts, such that dieters will perform significantly worse on verbal working memory tasks than non-dieters, and those high in preoccupying thoughts will perform worse on verbal working memory tasks than those low in preoccupying thoughts.

Firstly, it is expected that those currently dieting will score significantly higher on measures of cognitive restraint than those who are not currently dieting. Secondly, it is expected that those who are currently dieting will show significantly higher levels of preoccupying cognitions compared to those who are not currently dieting.

Dieting status is expected to interact with working memory such that those who are dieting will perform worse on measures of verbal working memory than those who are not currently dieting. Furthermore, those who are currently dieting are expected to show significantly more negative self-schemata regarding body and exercise beliefs as measured by the SCEE compared to non-dieters

As the primary hypothesis predicts that performance of working memory will be affected by preoccupation with food, shape, and weight, it is expected that effects will emerge such that 1.) dieters will score significantly higher on measures of cognitive restraint compared to non-dieters, 2.) dieters will score significantly higher on measures of preoccupying cognitions regarding food, shape, and weight compared to non-dieters, 3.) dieters will make significantly more negative and dysfunctional stem completions on the SCEE compared to non-dieters 4.) dieters will score significantly lower on measures of working memory compared to non-dieters, specifically, it is believed that the greatest difference will occur in measures of articulatory loop function.

CHAPTER V

RESULTS

A 4(dieting group) x 2(preoccupation level) factorial ANOVA was conducted for all analyses unless otherwise indicated. Analyses meeting the assumption of homogeneity of variance were followed up using Tukey's Test. Analyses that failed to meet with assumption of homogeneity of variance were followed up with Games-Howell test.

Demographics

ethnicity. The majority of the participants identified as Caucasian (87.8%). A subset of participants identified as Asian or Pacific Islander (2.44%), Black or African American (2.44%), Latina or Latin American (2.44%), Multi-ethnic (2.44%), Mexican / Mexican American (1.63%). or American Indian/Alaskan Native (.81%).

age. The analysis of age resulted in no significant effects, $F(3, 83) = 1.67$, $p > .05$. The average age of participants was 19.3 ($SD = 2.6$). Group 1 had a mean age of 19.4 ($SD = .70$), Group 2 had a mean age of 20.10 ($SD = 4.18$), Group 3 had a mean age of 18.4 ($SD = 2.44$), and Group 4 had a mean age of 18.64 ($SD = .75$).

smoking status. A frequency analysis revealed that the majority of the sample did not smoke, 99.1%. An ANOVA revealed that there were no significant differences between dieting groups on smoking status, $F(3, 99) = 2.01$, $p > .05$.

Dieting Behaviors

special diet. Individuals were asked to indicate if they were on any special diet (e.g. vegetarian, low carb). A vegetarian diet was reported by 3.4% of individuals. A vegan diet was reported by.8% of individuals. A gluten free diet was endorsed by 4.2% of individuals. A low carb diet was reported by 11% of individuals. A high protein diet was endorsed by 7.6% of individuals. A low fat diet was reported by 8.5% of individuals. A low calorie diet was endorsed by 16.1% of the sample. 11% reported being on an "other" type of special diet, the most frequently reported "other" diets were 'dairy/lactose free' and 'low sugar.' Finally, 53.4% reported not being on a special type of diet.

reasons for current diet. The majority of individuals reported dieting 'to improve appearance' (42.4%). 10.2% of individuals listed the reason for their diet as "other" of which the most common themes were allergies, preventing a prevalent family health disorder, social reasons (weddings), and religious reasons. Health reasons was cited as the reason for 7.6% of people reporting being on their diet. Doctor recommendation was cited by 1.7%, and 3.4% reported they "don't know" why they are on their current diet.

A one-way ANOVA revealed significant differences between dieting groups in their reasons for their dietary choice, $F(3,68) = 8.62$, $p < .001$. The Games-Howell post hoc testing revealed no significant differences between groups, but there was a trend for groups 1 and 2, to differ from 4 – with groups 1 and 2 being more likely to diet for appearance reasons, $p = .07$.

dieting frequency. There was a significant main effect of dieting group on frequency of lifetime dieting, $F(3, 99) = 15.54$, $p < .001$. The Games-Howell post hoc testing revealed Group 1 ($M = 2.61$, $SD = 1.08$) reported a higher frequency of lifetime dieting compared to group 2 ($M = 1.85$, $SD = .61$), group 3 ($M= 1.5$, $SD = .51$) and group 4 ($M = 1.2$, $SD = .41$), $p < .01$.

Group 2 reported a higher frequency of lifetime dieting compared to group 4, $p < .001$. There were no significant differences between groups 2 and 3, or 3 and 4, p's > .05.

dieting behaviors. In order to ensure participants were actually engaging in dieting behaviors when they reported 'Yes' to currently being on a diet, or indicating that they were 'dieting to lose weight' or to 'maintain weight' they were asked to report any of the following diet behaviors: fasting, restricting food intake, using diet pills, self-induced vomiting, using laxatives, using diuretics, using food substitutes, skipping meals, using cigarettes, or following a low carb/high protein diet. A response of 'Yes' was coded as one, and a response of 'No' was coded as 2, therefore results closer to one indicate a higher level of behavior endorsement. All results are displayed in Table 1.

Table 1. Breakdown of dieting behaviors reported by each group.

Dependent variable	*Group 1 Mean (SD)*	*Group 2 Mean (SD)*	*Group 3 Mean (SD)*	*Group 4 Mean (SD)*
1. Fasting	1.61 (.49)	1.62 (.49)	2 (0)	2 (0)
2.restricting food intake	1.25 (.44)	1.35 (.49)	1.72 (.46)	1.8 (.41)
3. Food substitute usage	1.5 (.51)	1.56 (.50)	1.6 (.50)	2 (0)
4. skipping meals	1.93 (.45)	1.41 (.5)	1.61 (.5)	1.93 (.26)

The two most highly endorsed behaviors were restricting food intake, 49.2%, and skipping meals, 45.8%. The next most highly endorsed behaviors were: using food substitutes, 35.6%, following a low carb/high protein diet, 25.4%, and fasting, 24.6%.

In regards to extreme dieting behaviors, 11% of participants reported using diet pills, 4.2% reported using laxatives, 2.5% reported self-induced vomiting, and 1.8% reported using diuretics. No participants endorsed increased cigarette usage.

In regards to extreme dieting behaviors, 11% of participants reported using diet pills, 4.2% reported using laxatives, 2.5% reported self-induced vomiting, and 1.8% reported using diuretics. No participants endorsed increased cigarette usage. Chi-square analyses were conducted in order to examine the percentage of behavioral endorsement by group, and to examine if certain behaviors were associated with certain behaviors. We did violate the assumption of Chi-square which states that cell counts must be greater than 5. In such cases it is recommended the Fishers exact test be used, however, Fishers exact test was unavailable on SPSS version 24, as such, tests were only interpreted as significant if $p < .01$. Results should be interpreted with caution.

There was a significant association between dieting group and whether or not participants endorsed fasting $\chi 2\ (3) = 17.25$, $p < .01$.

There was a significant association between dieting group and whether or not participants endorsed eating very little food (restriction) $\chi 2\ (3) = 19.95$, $p < .001$.

There was a significant association between dieting group and whether or not participants endorsed using food substitutes $\chi 2\ (3) = 11.81$, $p < .01$.

There was a significant association between dieting group and whether or not participants endorsed skipping meals $\chi 2\ (3) = 20.13$, $p < .001$.

There was no significant association between dieting group and whether or not participants endorsed using diet pills $\chi 2\ (3) = 4.64$, $p > .05$.

There was no significant association between dieting group and whether or not participants endorsed self-induced vomiting $\chi 2\ (3) = 2.05$, $p > .05$.

There was no significant association between dieting group and whether or not participants endorsed laxative usage $\chi 2\ (3) = 2.71$, $p > .05$.

There was no significant association between dieting group and whether or not participants endorsed diuretic usage $\chi 2$ (3) = 4.14, $p > .05$.

DEBQ – restraint subscale. There was a significant main effect of the dieting group on restraint scores, F (3, 90) = 5.82, $p < .01$. Observed power for this effect was .9. Upon examining the post-hoc tests, group 1 (M = 33.17, SD = 7.28) endorsed significantly higher levels of restraint than group 2 (M =27.27, SD = 6.71), group 3 (M = 23.05, SD = 5.46) and group 4 (M = 17.79, SD = 5.7). Group 2 endorsed significantly higher levels of restraint than group 4. No significant differences were observed for groups 2 and 3, or 3 and 4.

There was a significant main effect of preoccupation level on restraint scores F(1, 90) = 14.54, $p < .001$. Observed power for this effect was .9. The low preoccupation group (M = 22.4, SD = .91) endorsed significantly lower levels of restraint than the high preoccupation group (M = 28.72, SD = 1.38).

The interaction between dieting group and preoccupation level on restraint scores approached significance, F(3, 91) = 1.93, p = .13. Observed power for this effect was .5.

DEBQ-emotional eating subscale. There was no significant main effect of the dieting group on emotional eating scores, F (3, 90) = .012, $p > .05$.

There was a significant main effect of preoccupation level on emotional eating scores F (1, 90) = 10.31 $p < .01$. Observed power for this effect was .9. The low preoccupation group (M = 27.96, SD = 9.52) endorsed significantly lower levels of emotional eating than the high preoccupation group (M = 36.9, SD = 12.32).

The interaction between dieting group and preoccupation level on emotional eating scores was not significant, F (3, 91) = .37, $p > .05$.

DEBQ-external eating subscale. There was no significant main effect of the dieting group on external eating scores, F (3, 90) = .23, p >.05.

There was a significant main effect of preoccupation level on external eating scores F (1, 90) = 9.6 p < .01. Observed power for this effect was .9. The low preoccupation group (M = 30.6, SD = 5.73) endorsed significantly lower levels of external eating than the high preoccupation group (M = 34.06, SD = 5.47).

The interaction between dieting group and preoccupation level on external eating scores was not significant, F (3, 91) = .97, p > .05.

preoccupying cognitions. There was a significant main effect of dieting group on preoccupying cognitions, F (3, 96) = 16.84, p <.001. Group 1 (M = 75.49, SD = 17.34) scored significant higher than group 2 (M = 62.36, SD = 14.84), p < .01. Group 1 also scored significantly higher than group 3 (M = 53, SD = 12.53), p <.001. Group 1 also scored significantly higher than group 4 (M = 44.0, SD = 16.30), p < .0001. Group 2 did not significantly differ from group 3, p > .05, but did score significantly higher than group 4, p < .01. Groups 3 and 4 did not significantly differ, p > .05. Preoccupying cognitions were significantly correlated with several dieting characteristics as well as affective measurements, these correlations are displayed in Table 2. Correlations are described according to Cohen's (1988) recommendations where .1 is interpreted as small, .3 is interpreted as moderate, and .5 is interpreted as large.

Table 2. Correlations between preoccupying cognitions scores, dieting characteristics, and affective measures.

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.
1. PREOCCUPYING COGNITIONS	62.02	19.54	-							
2. LIFETIME DIETING FREQ.	2.0	1.0	.55**		-					

table 2 cont.

3.	**STAI-Y2**	**42.24**	**10.43**	**.53****	**.4****	-					
4.	**STAI-Y1**	37.74	10.17	.28**	.21*	.74**	-				
5.	**BDI**	30.03	8.18	.51**	.38**	.69**	.62**	-			
6.	**DEBQ_RESTRAINT**	26.95	8.55	.75**	.61**	.41**	.23*	.39**	-		
7.	**DEBQ_EMOTION**	32.31	11.97	.49**	.16	.31**	.28*	.43**	.27**	-	
8.	**DEBQ_EXTERNAL**	32.22	6.11	.33**	.04	.16	.1	.28**	.14	.5**	-

*significant at the .05 level (two-tailed)

** significant at the .01 level (two-tailed)

Preoccupying cognitions were significantly correlated with lifetime dieting frequency, r = .55, p (two-tailed) < .001. This can be interpreted as a large association.

Preoccupying cognitions were significantly correlated with STAI-Y2 scores r = .53, p <.001. This can be interpreted as a large association.

Preoccupying cognitions were significantly correlated with STAI-Y1 scores r = .28, p < .01. This can be interpreted as a small to moderate correlation.

Preoccupying cognitions were moderately correlated with BDI scores r = .51, p <.01. This can be interpreted as a large correlation.

Significant correlations between preoccupying cognitions and all the DEBQ subscales were observed. The correlation between preoccupying cognitions and the restraint subscale was significant, r = .75, p <.001 and can be described as a large association. The correlation between the emotional eating subscale and preoccupying cognitions was significant, r = .49, p <.001, and can be described as a moderate association. The correlation between the external eating subscale and preoccupying cognitions was significant, r = .33, p < .01, and can be described as a moderate association. Table 3 displays the scores on the disordered eating and dieting variables by group.

Table 3. Means and standard deviations by group for disordered eating dependent variables.

DEPENDENT VARIABLE	GROUP 1 MEAN (SD)	GROUP 2 MEAN (SD)	GROUP 3 MEAN (SD)	GROUP 4 MEAN (SD)
1. DIETING FREQ.	2.61 (1.08)	1.85 (.61)	1.5 (.51)	1.2 (.41)
2. FASTING	1.61 (.49)	1.62 (.62)	2 (0)	2.00 (0)
3. RESTRICTING FOOD INTAKE	1.25 (.44)	1.35 (.49)	1.72 (.46)	1.8 (.41)
4. FOOD SUBSTITUTE USAGE	1.5 (.51)	1.56 (.50)	1.6 (.50)	2.00 (0)
5. SKIPPING MEALS	1.28 (.45)	1.41 (.50)	1.61 (.50)	1.93 (.26)
6. PREOCCUPYING COGNITIONS	75.49 (17.34)	62.36 (14.84)	53 (12.53)	44.0 (16.30)
7.DEBQ_RESTRAINT SUBSCALE	30.38 (1.3)	27.07 (1.05)	23.21 (1.70)	21.63(2.30)
8.DEBQ_EMOTIONAL SUBSCALE	32.71 (2.4)	33.09 (1.98)	32.52(3.2)	33.21(4.32)
9.DEBQ_EXTERNAL SUBSCALE	32.29 (1.19)	33.2 (1.0)	32.59(1.6)	24.13(2.16)

Affect

STAI-Y1 and STAI-Y2. The analysis of STAI-Y1 resulted in no significant effects. Analysis of STAI-Y2 scores resulted in one significant result. There was no significant main effect of the dieting group on STAI-Y2 scores, F (3, 90) = 1.77, $p > .05$. There was a significant main effect of preoccupation level on STAI-Y2 scores F (1, 90) = 9.92, $p < .01$. Observed power for this effect was .87. The low preoccupation group (M = 37.34, SD = 9.39) reported significant less trait anxiety than the high preoccupation group (M = 46.78, SD = 9.09). There was no

significant interaction between dieting group and preoccupation level on STAI-Y2 scores, F (3, 91) = .07, p >.05.

Pearson correlations were conducted to examine the relationship between STAI-Y1 and Y2 scores, other affective measures, and dieting characteristics. All correlations are displayed in table 2. STAI-Y2 scores were moderately correlated with lifetime dieting frequency, r = .4, p < .01. There was also a small association between STAI-Y1 scores and lifetime dieting frequency, r = .21, p < .05. STAI-Y2 scores also showed a moderate correlation with DEBQ_restraint subscale scores r = .41, p < .01. STAI-Y2 scores were also moderately correlated with DEBQ_emotion subscale scores r = .31, p <.01. There was a small correlation between STAI-Y1 and the DEBQ_restraint subscale r = .23, p < .05. There was a small correlation between STAI-Y1 scores and the DEBQ_emotion subscale, r = .28, p <.05.

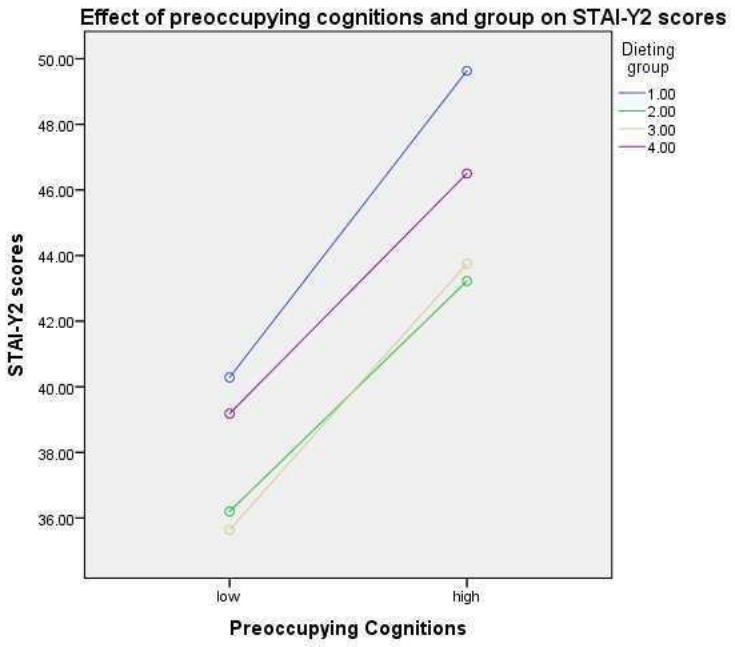

Figure 1. Preoccupation, diet group, and STAI-Y2. Scores on STAI-Y2 as a function of preoccupying cognition and group status.

BDI. A 4 (dieting group) x 2 (preoccupation level) factorial ANOVA was conducted on BDI scores. There was a marginally significant main effect of the dieting group on BDI scores, F (3, 91) = 2.67, p =.053. The Tukey post hoc test revealed that group 1 (M = 31.52, SD = 1.52) scored significantly higher than group 3 (M = 24.48, SD = 2.04), p > .01. Observed power for this effect was .6.

There was a significant main effect of preoccupation level on BDI scores F (1, 91) = 6.56, p = .01. The high preoccupation group (M = 31.44, SD = 1.65) scored significantly higher on the BDI than the low preoccupation group (M = 26.41, SD = 1.09), p = .01. Observed power for this effect was .7.

There was no significant interaction between dieting group and preoccupation level on BDI scores, F (3, 91) = .79, p >.05.

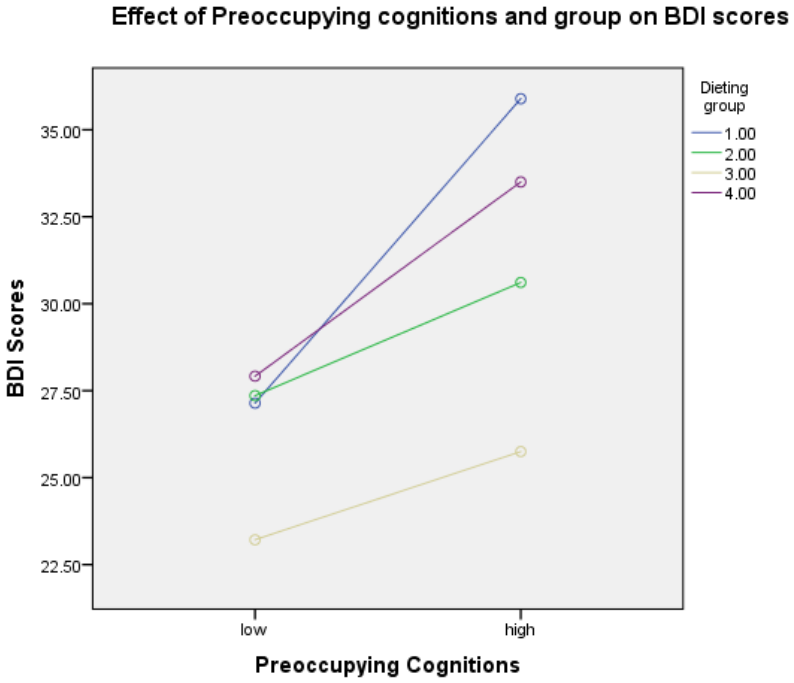

Figure 2. Preoccupation, dieting group, and BDI scores. Scores on the BDI as a function of preoccupying cognition and group status.

Pearson correlations were conducted to examine the relationship between BDI scores, other affective measures, and dieting characteristics. All correlations are displayed in table 2. There was a large correlation between BDI scores and lifetime dieting frequency, $r =. 51$, $p <.01$. The BDI correlated with all subscales of the DEBQ. BDI was moderately correlated with the DEBQ_restraint subscale, $r = .39$, $p <.01$. BDI scores showed a moderate correlation with the DEBQ_emotion subscale $r = .43$, $p < .01$. The BDI also showed a small correlation with the DEBQ_external subscale $r = .28$, $p < .01$.

OCI-R. There was a significant main effect of the dieting group on OCI-R scores, F (3, 90) = 3.46, $p < .05$. Observed power for this effect was .8. Upon examining the post-hoc tests, no significant differences were found.

There was a significant main effect of preoccupation level on OCI-R scores F (1, 90) = 5.93, $p < .05$. Observed power for this effect was .7. The low preoccupation group ($M = 27.55$, $SD = 9.78$) reported significantly less obsessive compulsive symptomology than the high preoccupation group ($M = 34.08$, $SD = 10.78$).

The interaction between dieting group and preoccupation level on OCI-R scores approached significance, F (3, 91) = 2.4, $p = .07$. Observed power for this effect was .6. Table 4 displays the variability in scores on the affect variables (BDI, STAI-Y1, STAI-Y2, OCI-R) by dieting group and level of preoccupying cognitions.

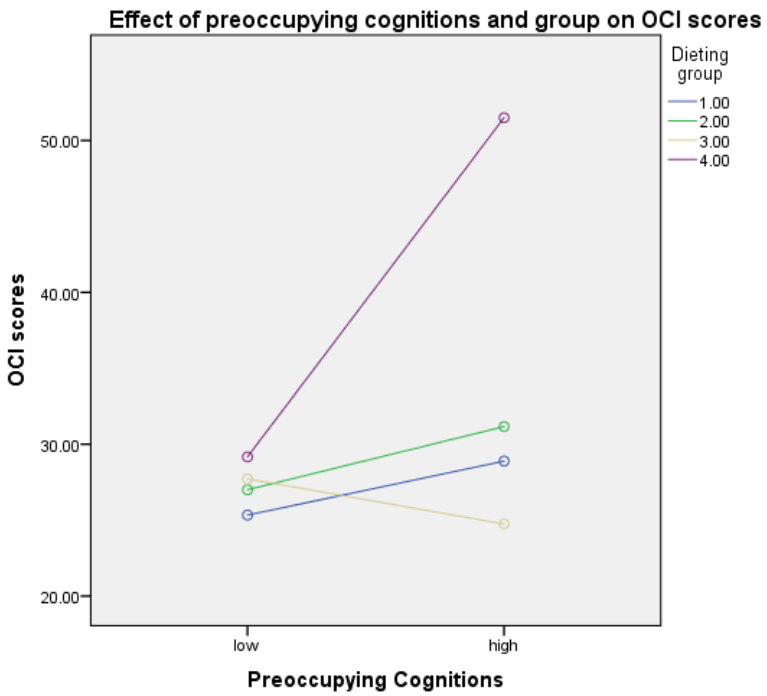

Figure 3. Preoccupation, dieting group, and OCI-R scores. Scores on the OCI-R as a function of preoccupying cognition and group status.

Table 4. Means and standard deviations by group for affect related dependent variables.

	LOW PREOCC				**HIGH PREOCC**			
	Group 1 M (SD)	Group 2 M (SD)	Group 3 M (SD)	Group 4 M (SD)	Group 1 M (SD)	Group 2 M (SD)	Group 3 M (SD)	Group 4 M (SD)
1. STAI-Y1	38.00 (12.61)	32.53 (9.80)	34.21 (8.95)	36.08 (12.98)	42.93 (7.88)	37.83 (9.76)	37.5 (10.12)	34.5 (9.19)
2. STAI-Y2	40.29 (14.04)	36.20 (8.77)	35.64 (8.35)	39.18 (8.55)	49.63 (7.01)	43.22 (10.29)	43.75 (8.06)	45.50 (10.61)
3.BDI	27.14 (8.40)	27.36 (9.72)	23.21 (4.48)	27.92 (7.49)	35.89 (5.07)	30.61 (8.68)	25.75 (3.40)	33.50 (13.44)
4. OCI-R	25.33 (4.03)	27.00 (7.27)	27.71 (8.30)	29.17 (15.40)	28.89 (9.78)	31.17 (10.76)	24.75 (4.35)	51.50 (32.36)

Cognitive variables

All means and standard deviations can be found for the RBANS, Mental Rotation, and SCEE in Table 5.

RBANS.

RBANS – delayed memory index. The analysis of the delayed memory index revealed no significant effects.

RBANS – immediate memory. The analysis of the immediate memory index revealed no significant effects.

RBANS – attention. The analysis of the attention index revealed no significant effects.

RBANS – language. The analysis of the language index revealed no significant effects.

RBANS – visuospatial/constructional. The analysis of the visuospatial/constructional index revealed no significant effects.

Mental rotation task. The analysis of the mental rotation task revealed no significant effect.

Random Generation. No significant results were observed for the random generation task. The random generation task scores range between 0 (completely random) and 1 (not random) and it should be noted that our sample did achieve randomness.

Self-schemata: SCEE.

SCEE: automatic. The analysis of the SCEE: Automatic task for positive responses revealed no significant effect. There was no significant main effect of dieting group on the amount of negative responses given to the automatic thought eliciting items on the SCEE, $F(3, 74) = 1.89$, $p > .05$.

There was a significant main effect of preoccupation level on the amount of negative responses given to the automatic thought eliciting items on the SCEE, $F(1, 74) = 8.37$, $p < .01$. Observed power for this effect was .8. Individuals high in preoccupation ($M = 3.4$) made significantly more negative responses than those low in preoccupation ($M = 1.2$).

There was no significant main interaction of dieting group and preoccupation level on the amount of negative responses given to the automatic thought eliciting items on the SCEE, $F(1, 74) = .57$, $p > .05$.

The analysis of the amount of neutral responses given to the automatic thought eliciting items on the SCEE resulted in no significant effects.

SCEE: conditional. The analysis of the SCEE: Conditional resulted in no significant effects. The analysis of the amount of dysfunctional responses given to the automatic thought eliciting items on the SCEE revealed no significant effects. The analysis of the amount of dysfunctional responses given to the automatic thought eliciting items on the SCEE produced no significant effect.

Table 5: Cognitive test results by preoccupying cognition level and dieting group.

		LOW PREOCC				**HIGH PREOCC**		
	Group 1	Group 2	Group 3	Group 4	Group 1	Group 2	Group 3	Group 4
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
1. RBANS: I.M.	46.71 (6.47)	47 (6.48)	48.69 (5.15)	47.77 (5.64)	46.22 (6.23)	45.07 (3.56)	49.00 (-)	46.03 (5.53)
2. RBANS: V.C.	33.29 (4.35)	35.92 (9.95)	35.77 (2.77)	34.45 (5.39)	34.78 (4.18)	34.21 (3.40)	31.00 (-)	35 (-)
3. RBANS: LANGUAGE	30.86 (4.34)	30.85 (5.52)	31.15 (4.43)	32.00 (4.8)	29.57 (4.21)	29.57 (4.93)	28 (-)	31 (-)
4. RBANS: ANT	74.43 (8.38)	79.00 (6.12)	71.62 (10.38)	68.36 (10.6)	69.26 (8.27)	72.93 (11.28)	70 (-)	86 (-)
5. RBANS: DM	51.86 (3.02)	52.69 (5.5)	51.34 (5.08)	52.09 (4.73)	51.26 (5.75)	50.07 (3.87)	54 (-)	53 (-)
6. RBANS TOTAL	237.14 (18.72)	245.46 (16.93)	238.77 (16.24)	235.18 (20.80)	231.09 (18.58)	231.86 (18.96)	232 (-)	257 (-)
7. RND. G	.22 (.06)	.19 (.06)	.20 (.08)	.17 (.10)	.21 (.08)	.19 (.04)	.26 (.04)	.17 (-)
8. MR	.59 (.29)	.52 (.23)	.61 (.23)	.48 (.34)	.51 (.22)	.57 (.12)	.48 (-)	.55 (-)

Table 5. cont.

9. SCEE (AUTO. POS)	**6.00 (1.83)**	**7.08 (1.98)**	**7.0 (3.21)**	**7.54 (2.54)**	**4.61 (2.31)**	**5.15 (1.68)**	**8.00 (-)**	**4.00 (-)**
10. SCEE (AUTO. NEG)	2.14 (1.86)	.92 (1.26)	1.00 (1.41)	.64 (.67)	3.96 (2.67)	2.69 (2.18)	2.00 (-)	5.00 (-)
11. SCEE (AUTO. NEUT)	3.71 (1.98)	4.08 (1.73)	3.92 (2.18)	3.73 (2.33)	2.91 (2.11)	4.04 (1.59)	2.00 (-)	4.00 (-)
12. SCEE (COND. FUNC)	3.00 (1.63)	4.46 (2.70)	3.62 (2.06)	3.09 (1.70)	2.70 (1.58)	3.31 (2.87)	2.00 (-)	3.00 (-)
13. SCEE (COND. DYS)	4.43 (1.72)	3.77 (2.49)	3.54 (2.11)	3.73 (1.35)	4.26 (1.96)	4.46 (2.47)	5.00 (-)	7.00 (-)
14. SCEE (COND. NEUT)	4.57 (2.07)	3.77 (1.96)	4.85 (1.91)	5.09 (2.30)	4.52 (2.15)	4.15 (1.63)	5.00 (-)	2.00 (-)

*RBANS: I.M = immediate memory, V.C = visuo/constructional, ANT = attention, DM = delayed memory. RND. G = random generation. MR = Mental rotation.

Verbal Working Memory.

Verbal working memory was assessed using the phonological similarity effect task and the word length effect task. For the phonological similarity effect task participants were presented with 2 lists which were read aloud by a computer. One list contained phonologically similar syllables (C, P, T, D, G), and one list contained phonologically dissimilar syllables (H, M, J, R, Z). Once the string was complete, participants were asked to recall and write down the letters in the order they were presented. The lists order was counterbalanced across participants.

For the world length effect task participants were presented with two lists of five words, one list containing short words (lie, jaw, cage, peak, best) and one list containing long words (advantage, digestive, illusion, half-hearted, runaway).

For both the phonological similarity effect task, and the word length effect task, a suppression condition was added. In other words, participants had to say the word “the” out loud while one of the lists was being presented to them. Participants then recalled the stimuli as

described above. All verbal working memory means and standard deviations are displayed in Tables 6, 7, 8 and 9.

Dissimilar. Results are reported for the recall of phonologically dissimilar syllables (I.e.: H, M, J, R, Z). There was a no significant main effect of dieting group on dissimilar syllable recall on the phonological similarity effect task, F (3, 65) = .53, $p > .05$.

There was no significant effect of preoccupation on dissimilar syllable recall, $F(1,65) = .14$, $p > .05$.

There was a significant effect of suppression on dissimilar syllable recall, F (1, 65) = 12.3, $p < .01$. Observed power was .9. Significantly fewer syllables were recalled under the suppression condition ($M = .88$, $SE = .06$) than the non-suppression condition ($M = .6$, $SE = .05$).

There was no significant interaction between dieting group and preoccupation on dissimilar syllable recall F (3, 65) = .79, $p > .05$.

There was no significant interaction of dieting group and suppression condition on dissimilar syllable recall, $F(3, 65) = .54$, $p > .05$.

There was no significant interaction of preoccupation level and suppression on dissimilar syllable recall, $F(1, 65) = 1.2$, $p > .05$.

There was a significant three way interaction of dieting group, preoccupation level, and suppression condition on dissimilar syllable recall, $F(1, 65) = 8.13$, $p < .001$, with high preoccupying weight loss dieters recalling the fewest syllables. Observed power was .8. This interaction is shown in figures 4 and 5.

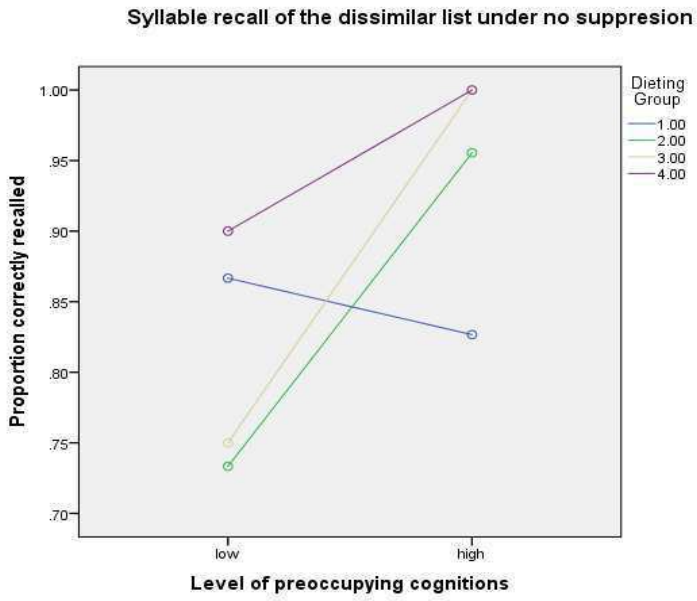

Figure 4. Syllable recall of the dissimilar list under no suppression. This figure shows the proportion of correctly recalled dissimilar syllables by dieting group and preoccupation level.

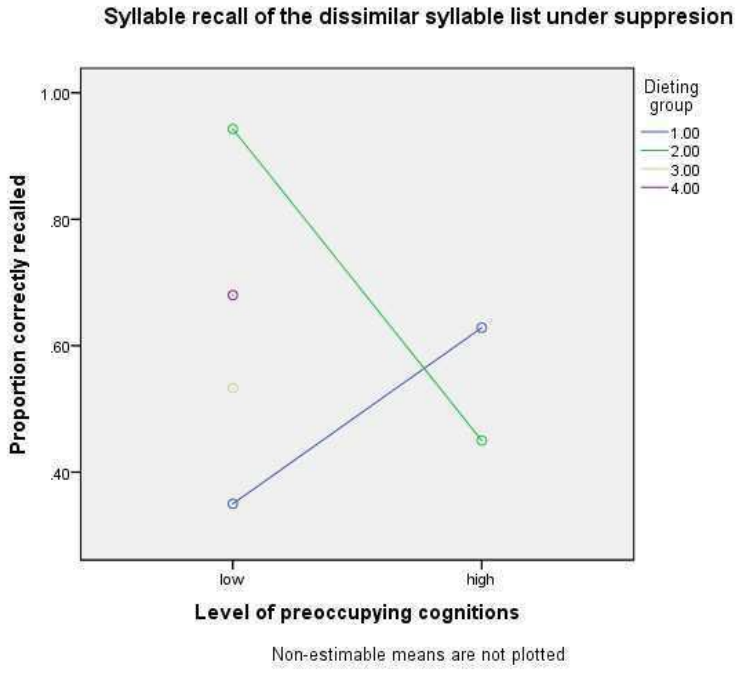

Figure 5. Syllable recall of the dissimilar list under suppression. This figure shows the proportion of correctly recalled dissimilar syllables by dieting group and preoccupation level.

Similar. Results are reported for the recall of phonologically similar syllables (C, P, T, D, G). There was a no significant main effect of dieting group on similar syllable recall on the phonological similarity effect task, F (3, 65) = 1.94, $p > .05$.

There was no significant effect of preoccupation on similar syllable recall, $F(1,65) = 1.9$, $p > .05$.

There was a significant effect of suppression on similar syllable recall, F (1, 65) = 15.9, $p < .01$. Observed power was .9. Post hoc test revealed that significantly fewer syllables were recalled under the suppression ($M = .5$, $SE = .06$) condition than the non-suppression condition ($M = .71$, $SE = .05$).

There was no significant interaction between dieting group and preoccupation on similar syllable recall F (3, 65) = .04, $p > .05$.

There was no significant interaction of dieting group and suppression condition on similar syllable recall, $F(3, 65) = 2.26$, $p > .05$.

There was no significant interaction of preoccupation level and suppression on similar syllable recall, $F(1, 65) = .3$, $p > .05$.

There was no significant three way interaction of dieting group, preoccupation level, and suppression condition on dissimilar syllable recall, $F(1, 65) = .3$, $p > .05$.

Short words. Results are reported for the recall of short words. There was a no significant main effect of dieting group on short word recall on the short version of the word length effect task, F (3, 65) = .6, $p > .05$.

There was no significant effect of preoccupation on short word recall, $F(1,65) = .5$, $p > .05$.

There was a significant effect of suppression on short word recall, F (1, 65) = 43.92, p < .001. Observed power was 1.0. There were significantly fewer words were recalled under the suppression condition (M = .33, SE = .05) than the non-suppression condition (M = .80, SE = .05).

There was no significant interaction between dieting group and preoccupation on short word recall F (3, 65) = .03, p > .05.

There was no significant interaction of dieting group and suppression condition on short word recall, F(3, 65) = .09, p > .05.

There was no significant interaction of preoccupation level and suppression on short word recall, F(1, 65) = .02, p > .05.

There was no significant three way interaction of dieting group, preoccupation level, and suppression condition on short word recall, F(1, 65) = .08, p > .05.

Long words. Results are reported for the recall of long words. There was a no significant main effect of dieting group on long word recall on the long version of the word length effect task, F (3, 65) = .4, p > .05.

There was a significant effect of preoccupation on long word recall, F(1,65) = 4.4, p < .05. Observed power was .5. Individuals in the high preoccupation group recalled significantly fewer words (M = .35, SE = .07) than individuals in the low preoccupation group (M = .46, SE = .05). Shown in figure 6.

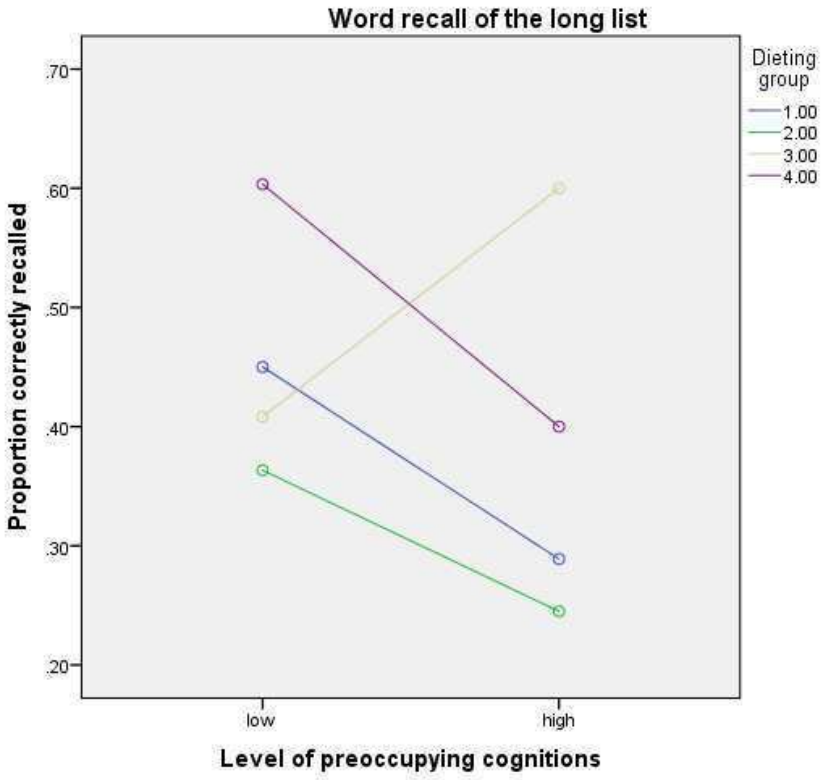

Figure 6. Word recall of long word list by preoccupation level and dieting group. This figure shows the proportion of correctly recalled words by dieting group and preoccupation level.

There was a significant effect of suppression on long word recall, F (1, 65) = 31.2, p < .001. Observed power was 1.0. Individuals in the suppression condition recalled significantly fewer words (M = .21, SE = .05) than those in the non-suppression condition (M = .56, SE = .05). The differences between suppression and no suppression conditions are shown in figures 7 and 8.

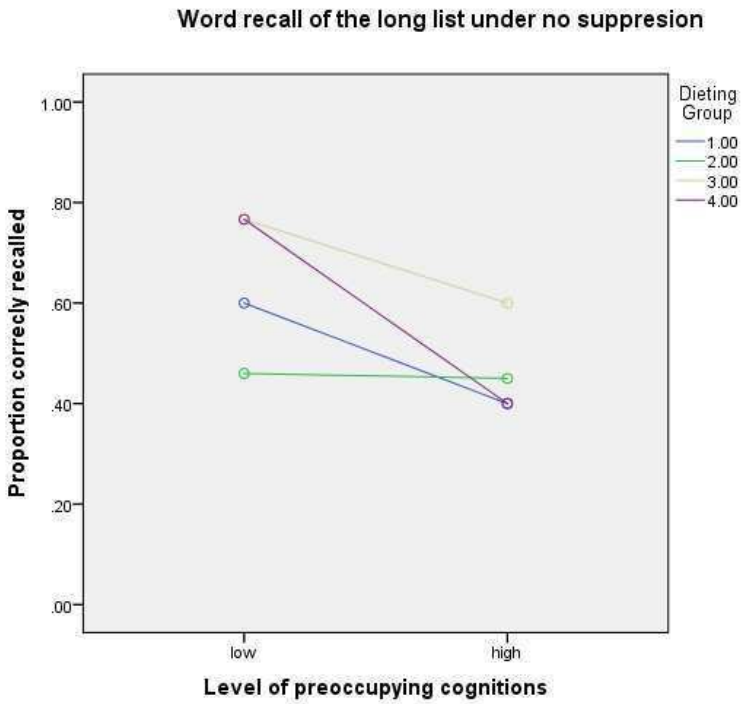

Figure 7. Word recall of long word list by preoccupation level and dieting group with no suppression. This figure shows the proportion of correctly recalled words by dieting group and preoccupation level under no suppression.

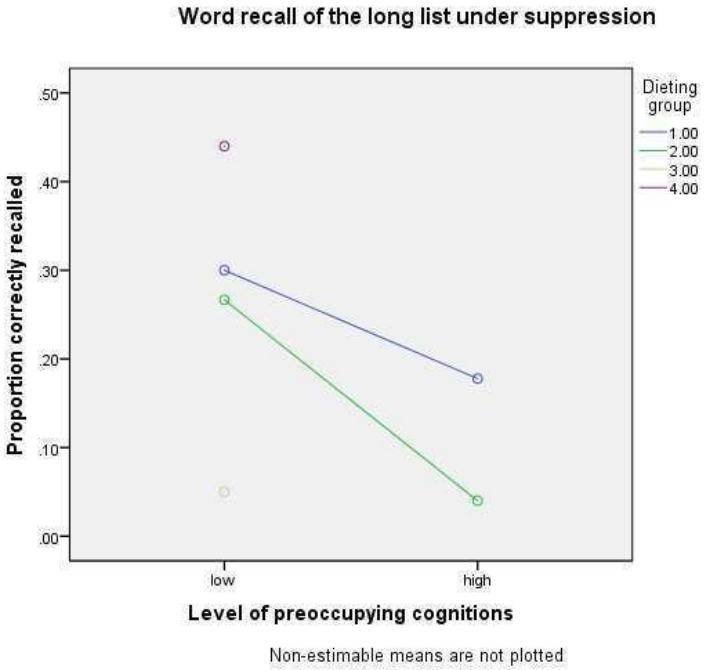

Figure 8. Word recall of long word list by preoccupation level and dieting group with suppression. This figure shows the proportion of correctly recalled words by dieting group and preoccupation level under suppression.

There was no significant interaction between dieting group and preoccupation on long word recall F (3, 65) = .26, p > .05.

There was no significant interaction of dieting group and suppression condition on long word recall, F(3, 65) = 1.5, p > .05.

There was no significant interaction of preoccupation level and suppression on long word recall, F(1, 65) = .17, p > .05.

There was no significant three way interaction of dieting group, preoccupation level, and suppression condition on long word recall, F(1, 65) = .74, p > .05.

Table 6. Verbal working memory scores by preoccupation and dieting group under no suppression.

	LOW PREOCC.			
	NON-SUPPRESION			
	Group 1	Group 2	Group 3	Group 4
	M (SD)	M (SD)	M (SD)	M (SD)
1. P.S. (SIM.)	.75 (.30)	.66 (.19)	.87 (.21)	.60 (.28)
2. P.S. (DISS.)	.87 (.23)	.73 (.24)	.75 (.50)	.90 (.18)
3. W.L. (SHORT)	.70 (.47)	1 (.0)	.55 (.19)	.88 (.27)
4. W.L. (LONG)	.60 (.53)	.46 (.35)	.77 (.23)	.77 (.27)

P.S. = phonological similarity effect task, W.L. = word length effect task, SIM = Similar, DISS = Dissimilar

Table 7. Verbal working memory scores by preoccupation and dieting group under suppression.

	LOW PREOCC.			
	SUPPRESION			
	Group 1	Group 2	Group 3	Group 4
	M (SD)	M (SD)	M (SD)	M (SD)
1. P.S. (SIM.)	.40 (.20)	.23 (.23)	.3 (.26)	.67 (.30)
2. P.S. (DISS.)	.35 (.47)	.94 (.15)	.53 (.41)	.68 (.33)
3. W.L. (SHORT)	.47 (.46)	.32 (.23)	.27 (.30)	.47 (.21)
4. W.L. (LENGTH)	.30 (.35)	.27 (.12)	.05 (.10)	.44 (.3)

P.S. = phonological similarity effect task, W.L. = word length effect task, SIM = Similar, DISS = Dissimilar

Table 8. Verbal working memory scores by preoccupation and dieting group under no suppression.

	HIGH PREOCC.			
	NON-SUPPRESION			
	Group 1	Group 2	Group 3	Group 4
	M (SD)	M (SD)	M (SD)	M (SD)
1. P.S. (SIM.)	.74 (.3)	.65 (.25)	-	-
2. P.S. (DISS.)	.83 (.3)	.96 (.09)	1.0 (-)	1.0 (-)
3. W.L. (SHORT)	.84 (.31)	.84 (.22)	-	-
4. W.L. (LENGTH)	.40 (.33)	.45 (.21)	.60 (.0)	.40 (-)

P.S. = phonological similarity effect task, W.L. = word length effect task, SIM = Similar, DISS = Dissimilar

Table 9. Verbal working memory scores by preoccupation and dieting group under suppression.

	HIGH PREOCC.			
	SUPPRESION			
	Group 1	Group 2	Group 3	Group 4
	M (SD)	M (SD)	M (SD)	M (SD)
1. P.S. (SIM.)	.38 (.32)	.42 (.41)	.6 (-)	1 (-)
2. P.S. (DISS.)	.63 (.41)	.45 (.19)	1.0 (-)	1.0 (-)
3. W.L. (SHORT)	.35 (.3)	.25 (.18)	.30 (.42)	.2 (-)
4. W.L. (LENGTH)	.18 (.19)	.04 (.09)	-	-

P.S. = phonological similarity effect task, W.L. = word length effect task, SIM = Similar, DISS = Dissimila

CHAPTER VI

DISCUSSION

The main purpose of this study was to develop a better understanding of the ways in which preoccupation with food, shape, weight, and appearance interacted with cognitive performance, specifically working memory, in a sample of dieters and non-dieters. In order to achieve this aim the study employed a 4(dieting status) x 2(preoccupation level) factorial design, with a series of factorial ANOVAs being conducted on the primary dependent variables: scores on the articulatory loop task, visuospatial sketchpad task, and central executive task. Notably, we also improved upon previous literature by using more robust measures of preoccupation, taking into consideration general neuropsychological performance, and using tasks designed to specifically target the phonological loop, articulatory rehearsal process, and the visuospatial sketchpad. Finally, we examined the relationship between several affective measures (depression, anxiety) and dieting behaviors.

Dieting behaviors

reason for current diet. The majority of participants reported dieting 'to improve appearance.' Additionally, there was a trend for group 1 (individuals who reported being on a diet, and indicated they were dieting to lose weight) to be more likely to report dieting primarily for appearance reasons. American culture emphasizes a thin is beautiful ideal, which is demonstrated by the fact that both Caucasian and African American males will choose underweight and normal weight female figures as ideal (Dunkley, Wertheim, & Paxton, 2001).

This pressure to be thin is indeed felt by women. According to results obtained from a longitudinal study conducted by Stice, Mazotti, Krebs, & Martin (1998) perceived pressure to be thin from family, peers, and the media predicted increased dieting over 9 months. Based upon the American culture focus on the thin ideal, one would expect women to engage in weight loss efforts in order to achieve the societal ideal, and to "fit in" among peers. These findings contribute to the growing literature regarding how beauty/appearance standards influence dietary decisions.

dieting frequency. It was observed that group 1 reported a significantly greater lifetime frequency than all other dieting groups. Additionally, it was observed that group 2 had a higher frequency of lifetime dieting compared to group 4. There are a multitude of reasons why individuals who engage in weight loss dieting end up engaging in a greater proportion of lifetime dieting efforts than their weight maintenance, or non-dieting peers. Weight loss attempts have been found to be related to weight gain! A longitudinal study using twin pairs from the FinnTwin16 study investigated the paradox that is the association between dieting and weight gain. Participants reported their number of lifetime intentional weight loss (IWL) episodes (never/once/2-4x/5+) and BMI. Weight gain differed significantly by IWL group, with individuals reporting no IWL gaining the least, and those with five times or more IWLs gaining the most at all levels of BMI. In pairs of monozygotic twins, those with IWLs were significantly heavier than their co-twin with no IWL. In other words, frequent IWLs reflect susceptibility to weight gain.

This study refutes the stance that dieting frequency is related to the propensity to be obese, and garners evidence for restrictive preoccupation theories of dieting (Dulloo, Jacquet, & Montani, 2002; Polivy & Herman, 1985). There is a plethora of research on the ineffectiveness

of deprivation on weight loss efforts. For example, in a naturalistic experiment examining the relationship between dietary restraint, stress, and calorie consumption, it was found that restrained eaters are particularly vulnerable to adverse effects of stress on health, through influences on food intake. In other words, those identified as restrained eaters through the DEBQ consumed significantly more calories than non-restrained eaters when reporting times of high stress (Wardle, Steptoe, Oliver, & Lipsey, 2000). Additionally, restrained eaters tend to increase their calorie consumption following high-calorie preloads. In other words, when presented with a high calorie food that they are required to consume, restrained eaters will subsequently over eat when they are presented with additional snack options (see Lowe, 2002 for a review).

As further demonstrated by these results, dieting can often "backfire" and result in a cycle of weight loss, weight gain, and then reinitiated weight loss efforts. Individuals in our study reported skipping meals and food intake restriction as the most common dieting behaviors (45.8% and 49.2% respectively). Additionally, group 1 and group 2 reported significantly restricting food intake significantly more than groups 3 and 4. Groups 1 and 2 also reported significantly skipping meals more than group 4. The tendency for the weight loss dieters to endorse restrictive dieting practices, and report greater frequency of lifetime dieting are in line with findings that restrictive dieting practices can often result in a rebound effect.

dieting behaviors. Our results differed from a similar study examining types of dieting behaviors in those indicating diet for weight loss versus dieting to maintain conducted by Timko et al., (2006). Timko et al., (2006) observed that individuals dieting to lose weight were engaging in a low carb dieting strategy, compared to those who were dieting to maintain. Our results indicated no significant differences. Additionally, Timko et al., (2006) found no significant

differences between groups in caloric restriction/reduction. However, our weight loss groups restricted their caloric intake significantly more than our dieting to maintain groups.

Given the subjectivity in defining what it means to diet, examining behaviors are often utilized to clarify respondents' intentions when they indicate dieting. However, conflicting results in group differences between our sample and similar samples, demonstrates that endorsement of dieting behaviors may change depending on the time and age group. Timko et al., conducted their study over ten years ago, and used participants ranging from 18 years of age to 55 years of age.

The most popular diets in 2006 did indeed revolve around low-carb strategies. For instance, Beyoncé endorsed the "master cleanse" which is a concoction of hot water, lemon juice, maple syrup, and cayenne pepper (Rotchford, 2013). Additionally, around this time period is when Atkins (high-fat, low-carb eating plan) became mainstream, as well as South Beach (high-protein, low-carb). While Atkins and South Beach are still around today, diets such as 'The Zone Diet,' 'Paleo,' 'Ketogenic,' 'Mediterranean' and Weight Watchers are common practice (Nordqvist, 2017).

The data obtained in this study in comparison with Timko et al., (2006) suggest the following: it is important to have participants to clarify intentions when asking them "are you dieting" because dieting is associated with a diverse array of behaviors, endorsement of dieting behaviors may differ depending on what is present in popular culture at the time, and more research is needed on the frequency of weight loss versus weight maintenance behaviors in order to develop more valid psychometric tools.

DEBQ restraint. The concept of restraint has been prominent in the eating behavior literature for many years. Dieting and dietary restraint are often used interchangeably (Tuschl,

1990; Green, Rogers, Elliman, Gatenby, 1993). Dietary restraint is conceptualized as consciously controlling food intake to prevent weight gain and promote weight loss (Tuschl, 1990), and the traditional definition of dieting is "practice of eating food in a regulated and supervised fashion to decrease, maintain, or increase body weight" (Dieting, 2018). As such, when we focus on dieting for weight loss, restraint becomes a crucial feature of promoting the caloric deficit which leads to weight loss. Individuals dieting to maintain their weight, thus would be expected to exhibit mild levels of restraint in order to avoid weight loss, as well as weight gain (Green, Rogers, Elliman, Gatenby, 1993)

Therefore, one would expect individuals dieting for weight loss to endorse higher levels of dietary restraint than non-weight loss dieters, and non-dieters. This is indeed what our results indicted. Individuals in group 1 who self-identified as dieters, and also reported dieting for weight loss, reported higher restraint scores than all other groups. Group 2, individuals who did not self-identify as a dieter, but indicated they were trying to lose weight, exhibited higher restraint scores than group 4 (non-dieting). Group 3 (weight maintenance) did indeed fall in the middle. Group 3 was not significantly different than group 2 or 4, but did score lower on restraint than group 2, and higher than 4.

These results are in line with the hypotheses of restraint theory (Herman, Polivy, 1980), as well as empirical research. Green, Rogers, Elliman, and Gatenby (1994) reported that scores for restrained eating were significantly higher in the dieting groups than the non-dieting groups. In females entering their first year of college, the "freshman 15" is a major concern. Indeed, most females will gain a small amount of weight (around 3lbs) but those who lose weight exhibit significantly higher dietary restraint scores than their weight gaining peers (Delinsky, & Wilson, 2008).

Our results additionally indicated that individuals who scored high in preoccupying cognitions scored significantly higher on restraint. This study was the first to dichotomize individuals based upon preoccupying cognitions, as such, the results are novel, but can be explained from a cognitive self-regulation perspective. Individuals wanting to achieve weight loss must resist impulses, for example, if you are trying to lose weight, you must resist the urge to eat a whole cake! Briefly, in order to engage in restraint, individuals must be aware of their environment, their self-physiology and their psychosomatic states. For example, one item on the DEBQ Restraint subscale states "Do you watch exactly what you eat?" and this is would require a level of awareness as reflected by the item on the preoccupying cognitions scale which states "I am aware of the sugar and fat content in foods."

Hofmann, Rauch, and Gawronski (2006) used a self-regulation framework to examine how dietary restraint, automatic attitudes, and self-regulation resources affected eating behavior. Authors argued that self-regulation requires more cognitive resources compared to automatic/impulsive behaviors, and thus, if cognitive capacity is high then an individual can self-regulate. If cognitive capacity is diminished, automatic/impulsive processes would rule. Participants were given an automatic candy attitudes measure, a dietary restraint self-report measure, and candy consumption was measured post experiment by researchers. In order to manipulate self-regulation resources participants watched a movie prior to the presentation of candy, and were instructed to either suppress or express their emotions. Results were aligned with initial hypotheses, and a main effect of self-regulation resources was observed. When self-regulation resources were high, candy consumption was uniquely related to dietary restraint.

Further, research has showed that trying to engage in thought suppression can actually decrease restraint (Muraven, Collins, & Neinhaus, 2002). If individuals are seeking weight loss,

preoccupying cognitions may arise as a result of dietary restraint, or may lead to dietary restraint. However, from a self-regulation perspective it is reasonable to conclude that preoccupying cognitions may serve a self-regulation function which aids in dietary restraint.

DEBQ-emotional eating subscale. The emotional eating subscale of the DEBQ measures eating in response to clearly labeled (e.g.: anger) and diffuse emotions (e.g.: boredom) (Van Strien, Frijters, Bergers, & Defares, 1986). We observed no significant differences among dieting groups on emotional eating which is similar to previous literature. Green, Rogers, Elliman, Gatenby, (1993) observed no significant differences between dieting individuals and non-dieting individuals on the emotional eating subscale. The main conceptualization behind emotional eating is a psychosomatic one. Studies examining negative affect in obese individuals have observed overeating in response to negative emotional state (for review see Geliebter & Aversa, 2003). These studies propose that overeating is a learned response which lessens the negative emotional state (Geliebter & Aversa, 2003; Kaplan & Kaplan, 1957). It then appears, that emotional eating results are affected by BMI. We did not record BMI explicitly, but asked participants for their highest and lowest weight at current height, and the majority fell into a "normal" BMI category.

Geliebter and Aversa (2003) administered appetite and feeding questionnaires to investigate how emotional states and situations can affect food intake in underweight, normal weight, and overweight individuals. Results showed that underweight individuals reported eating less than both the normal and overweight groups during negative emotional states and situations, but also reported eating more than the other groups during positive emotional states and situations. Given that our sample was mostly "normal" our results are consistent with previous findings.

Our results additionally indicated that individuals who scored high in preoccupying cognitions scored significantly higher on emotional eating. This study was the first to dichotomize individuals based upon preoccupying cognitions, as such, the results are novel. Two explanations are plausible. The first follows the psychosomatic theory posited above. It is reasonable to hypothesize that preoccupying cognitions could either elicit negative affect, or be elicited by negative affect. Regardless, through learning, individuals seek to reduce this negative affect by succumbing to their preoccupying cognitions by eating (Kaplan & Kaplan, 1957). The second explanation draws on the ruminative thinking style perspective (mentioned in regards to affective differences). If a ruminative thinking style does indeed underlie dieters' preoccupation with food, shape and weight, it is possible that this ruminative thinking style promotes emotional eating. This result is supported by evidence of rumination being an etiological factor for bulimia (Nolen-Hoeksema, Stice, Wade & Bohon, 2007). Nolen-Hoeksema and colleuges (2007) explain that binging in bulimia nervosa is a response to rumination. Rumination induces a negative self-focused attention which causes distress to individuals, and in order to escape the self, individuals adopt maladaptive behaviors such as binging. Future work should examine ruminative thinking styles and preoccupying cognitions in a sample of dieters and non-dieters to establish further correlational evidence. Ultimately, a longitudinal study should be conducted measuring ruminative thinking styles, preoccupying cognitions, and the emergence of dieting frequency, and development of clinical eating disorders.

DEBQ-external eating subscale. The external eating subscale of the DEBQ measures eating in response to external stimuli. We observed no differences on external eating behavior endorsement based on dieting group, which aligns with previous literature. Green, Rogers,

Elliman, Gatenby, (1993) observed no significant differences between dieting individuals and non-dieting individuals on the external eating subscale.

This study was the first to dichotomize individuals based upon preoccupying cognitions and examine external eating, as such the results are novel. Self-regulation theory posits a possible explanation as to why those high in preoccupying cognitions endorsed higher levels of external eating. As mentioned above, individuals will only be able to self-regulate if they have the cognitive resources to do such (Muraven, Collins, & Neinhaus, 2002). It may be that preoccupying cognitions degrade some self-regulation resources by being cognitively demanding, or in other words, taxing one's cognitive load. The resources that are devoted to the preoccupying cognitions, thus weaken the individuals' self-regulation tendencies, and make the individual susceptible to external food cues. This explanation may seem contradictory to the findings that individuals high in preoccupying cognitions also exhibited high levels of cognitive restraint. However, evidence has established that restraint is not an effective dieting strategy, and leaves individuals susceptible to over eating (Lowe, 2002; Wardle, Steptoe, Oliver, & Lipsey, 2000). In sum, individuals high in preoccupying cognitions endorse high levels of restraint. However, this restraint can only be maintained for so long before cognitive resources break down. Once these cognitive resources break down, individuals are susceptible to emotional and external eating behaviors.

preoccupying cognitions. Dieters showed significantly greater levels of preoccupying cognitions compared to non-dieters. Specifically, self-identified dieters indicating they were dieting for weight loss, had significantly more preoccupying cognitions than any other group. Additionally, preoccupying cognitions were positively correlated with both trait anxiety, state anxiety, and BDI scores indicating that as the level of preoccupying cognitions increased, so did

an individual's reported state and trait anxious symptomology. This finding is important for several reasons. Firstly, it demonstrates that dieters do indeed think about food more often than non-dieters. Secondly, it shows that dieting does indeed utilize cognitive resources / impact cognitive load, as a significant amount of a dieter's thoughts at any given moment are concerned with food, shape, or weight. Third, preoccupying cognitions were associated with several scales measuring negative affect which will be described below. These associations with negative affect are important because preoccupations could be causing dieters significant distress, and ultimately effecting their quality of life.

Evidence of the distress of preoccupying cognitions comes from dieting literature, clinical eating disorder literature, and literature of other clinical disorders marked by preoccupation/obsessive thoughts. A landmark study conducted by Polivy and Herman (1999) investigated the relationship between perceived distress and feeding behaviors. Female college students were led to believe that they had performed poorly on a cognitive task, subjects were then either given access to an unlimited, or limited, amount of ice cream to taste and rate for "another experiment". Finally, participants were given questionnaires about restrained eating, dieting status, and affect. When probed about their affect dieters reported significant distress, but attributed this distress to the consumption of the ice cream, significantly more so than non-dieters. A study more recent study conducted by Oliver and Huon (2000) focused on the cognitive aspects of preoccupying thoughts in individuals with disordered eating behaviors. Researchers examined the affective effects of thought suppression attempts in disinhibited eaters (those with a tendency to overeat/binge) and found that these individuals had a high number of thoughts about food, and attempts to suppress these thoughts resulted in self-reported anxiety and distress.

A study by Jones and Rogers (2003) tied previous findings regarding distress, and preoccupying thoughts together. Dieters and non-dieters were required to consume a chocolate bar prior to starting a battery of cognitive tests. Upon completion of these tasks, participants were probed about their affect, and performance on the test battery. Dieters reported a significant increase in the number of food and dieting-related thoughts which they believed to be distracting to the task at hand. As such it appears that dieters show increased preoccupation with food, shape, and elevated levels of anxiety and depression are associated with these preoccupations. The distress from these thoughts arise because they are distracting in nature, or because they elicit feelings of guilt.

Ingram (1990) argued that self-focused attention, or an awareness of self-referent internally generated information, is the hallmark of many clinical disorders. The similarities between this self-focused attention and preoccupation are clear. Ingram (1990) describes that individuals who fail to disengage from a thought cycle of which they are the subject, are subjected to significant distress or affective consequences. Indeed, many clinical disorders are marked by recurrent and persistent thoughts. Examples include Obsessive Compulsive Disorder (OCD), Generalized Anxiety Disorder (GAD), and depression. According to the DSM, diagnostic features of OCD include: preoccupations that are time consuming and distressing. GAD is marked by excessive anxiety, and worry, which the individual finds difficult to control. Additionally, preoccupation with food, shape, and weight is a sign (and symptom) of anorexia nervosa (American Psychiatric Association, 2013; Cooper & Fairburn, 1992). Given the similarities in the affective properties of preoccupation in dieters with a clinical sample, and their distressing qualities, preoccupation may be an important early identifier of more serious clinical behavior and thus moving forward, deserves research attention.

A note on ruminative thinking: mode of responding to distress that involves repetitively and passively focusing on symptoms of distress and the possible causes and consequences of these symptoms'' (Nolen-Hoeksema, 2008, p. 400).

Affect

BDI. Dieters showed significantly more depressive symptoms than non-dieters. This result aligns with previous research indicating that depression, body-image dissatisfaction, and dieting behaviors develop concurrently. In the second decade of life females display a sharp increase in depression compared to their male counterparts. A proposed explanation is that as females move into adolescence, their body changes in ways that move them away from the societial thin ideal. This movement away from thinness increases dissatisfaction with their bodies, and thus, negative affect. Stice et al., (2000) conducted a longitudinal study of over 1,000 female high school students, where depression, restrained eating (dieting), and body dissatisfaction were measured. The results indicated the body dissatisfaction predicted depression diagnosis at follow up. More specifically, the model found that the effects of body dissatisfaction on depression are partially mediated by increased dietary restraint.

In 2002 Ackard et al., examined dieting frequency, disordered eating behaviors, affective disorders, and body image. Over 300 female were surveyed from a college campus, and categorized into individuals who never dieted, dieted 1–5 times, or dieted 6 or more times. Researchers found a positive association between depression as measured by the Center for Epidemiological Studies—Depression scale (CES-D) and dieting frequency. Individuals who never dieted had the lowest levels of depression (M = 12.35, SD = 9.86), as dieting frequency increased depressive symptomology did as well. Individuals who dieting 1-5 times (M = 15.19,

SD = 9.3) still showed less depressive symptoms than those who dieted 6 or more times (*M* = 22.46, *SD* = 13.07).

Most recently Gillen et al., found an association between dieting behaviors and depressive symptomology (2012). Over 100 men and women with an average age of 24 completed self-report measures of depression and dieting behavior. Women tended to utilize more healthy (e.g.: eating vegetables) and unhealthy (e.g. skipping meals) dieting behaviors than men, and women who had more depressive symptoms engaged in fewer healthy dieting behaviors and more unhealthy dieting behaviors than women who had fewer depressive symptoms. Our results support previous literature indicating the robust relationship between depression and dieting.

Conversely, we also observed a significant difference in depression symptomology between individuals exhibiting high and low levels of preoccupying cognitions. Individuals in the high preoccupying cognitions group reported significantly greater depressive symptoms compared to the low preoccupying cognitions group. Significantly less work has been done in this area. To the authors' knowledge, no explicit studies have examined the relationship between preoccupying cognitions surrounding food, shape, and weight, and depression. However, given the nature of the BDI items (e.g.: I can't concentrate as well as usual) and studies demonstrating that individuals with ruminative thought styles tend to exhibit higher levels of depressive symptoms (see Nolen-Hoeksema, 2000) it may be that both the BDI and the preoccupying cognitions scale are tapping into a shared construct of ruminative thinking.

State and trait anxiety: STAI-Y1 and STAI-Y2. We found no differences in STAI-Y1 scores (state anxiety) between dieting groups, or between preoccupying cognitions groups. The majority of the research examining dieting and state level anxiety has been done so utilizing

paradigms to induce anxiety. For instance, Mills and Palandra (2008) wanted to examine the effects of perceived caloric content of a preload on eating behaviors. Briefly, the preload paradigm requires presenting individuals with some food item of which they are instructed to consume all of for the purpose of the experiment. After completing a filler task, snack food items are brought out to the participant for them to rate on taste. Unbeknownst to the participant, the snack food items are weighed beforehand, and researchers are interested in the amount of food consumed following the preload. For the restrained eater, the perception of a diet transgression, *an anxiety inducing situation*, results in consuming food until capacity.

Mills and Palandra (2008) randomized participants into one of three conditions. Participants could receive milkshake preload where they were informed the milkshake was of high caloric value, low caloric value, or receive no preload. Participants completed hunger and mood self-reports and then were instructed to consume the milkshake. Participants then completed surveys relating to mood, eating and dietary habits, and finally were presented with three different types of cookies that they were asked to rate on taste. Results indicated that consuming the high calorie milkshake increased anxiety from pre to post test.

As such, simply asking participants to report their dietary behaviors may not be enough to significantly elevate state anxiety levels because participants are not faced with any distressing choice (such as eating a palatable food in the absence of hunger), or engaging in some cognitively distressing and demanding task (such as resisting a tempting food, or having to eat a tempting food one knows is detrimental to their diet).

We observed no significant differences in dieting groups on STAI-Y2 (trait anxiety) scores, however, we did observe significant differences among preoccupation level. Individuals in the high preoccupation group reported significantly more anxiety than those in the low

preoccupation group. This finding is important because our results may help explain contradictory existing literature. Briefly, our finding may have emerged because of the nature of preoccupation. Trait anxiety, and preoccupying cognitions may share an underlying feature, which is rumination. The importance of our results, and purposed reason for the findings are detailed below.

Our results may help explain contradictory existing literature: Examining preoccupation with food, shape, and weight, in relation to dieting status is a fairly unexplored area. To the author's knowledge, no studies have examined trait anxiety as a function of both dieting status and preoccupying cognitions OR even preoccupying cognitions alone. However, there is some literature examining trait anxiety in dieters by measuring dietary strategies and restraint.

Firstly, a meta-analysis by French and Jeffery (1994) concluded that "dieting is usually not associated with …severe psychological reactions" (p. 195). French and Jeffrey point out that the unstandardized measurement of dieting status leads to differing results in regards to dieting prevalence, separating intention from behavior, and ultimately make the effects of dieting difficult to interpret. As such, they report that some studies such as Herman and Polivy (1975) demonstrate increases in anxiety in a sample of college students over the course of a diet, whereas studies such as Wadden et al, (1988) showed decreases in psychopathological symptoms over the course of a diet. Green and Rogers (1995) found no difference in state or trait anxiety in individuals who reported being on a diet at session one, but not at session two.

Stewart, Williamson, and White (2002) for example, wanted to investigate how the usage or rigid ("all or nothing") versus flexible (a graduated approach) dieting strategies related to eating disorder symptoms, BMI, and mood. Of particular interest to the topic at hand, is their comparison of dieting strategies to the STAI. Results indicated that only rigid control strategies

were moderately correlated with the STAI-Y2 (r =.30). The sample was then divided into Rigid dieters and Flexible dieters using a median split of scores on the dieting strategies measure. When an ANOVA was then conducted, rigid dieters scored significantly higher than flexible dieters on the STAI-Y2. These results contradict our own because we failed to see an effect of dieter emerge for any group. However, it could be that rigid dieting is a characteristic parallel to high preoccupying cognitions. If rigid dieting operates on an "all or none" principle, rigid dieters would have many more rules to keep track of, and encounter tempting stimuli more frequently than flexible dieters. In other words, preoccupation may be a feature associated with rigid dieting, and thus, results mentioned above reflect a difference in preoccupation.

Our results may help explain the contradictory research thus far, as anxiety may be more related to preoccupying cognitions, as opposed to just dieting status. Our results can be explained by examining the similarities between preoccupying cognitions and core features of anxiety. Both anxious and preoccupying thoughts are characterized by the large frequency of thoughts occurring, as well as rumination. Although the STAI-Y2 focuses on general anxiety by asking questions such as: "Some unimportant thought runs through my mind and bothers me," and "I take disappointments so keenly that I can't put them out of my mind" and the preoccupying cognition scale is concerned with food, shape, and weight, both scales may be tapping into an individual's adoption of ruminative thought patterns/styles. It may indeed be this ruminative thought pattern/style that contributes to the etiology of trait anxiety, and preoccupying cognitions in dieters. This interpretation is supported through existing literature linking rumination and anxiety. For example, rumination is considered a psychological vulnerability for depression and anxiety. A study conducted by Roelofs, Huibers, Peeters, and Arntz (2008) had the aim of examining the effect of rumination on neuroticism and symptoms of depression and anxiety in a

sample of non-clinical undergraduates. Results revealed that indeed, rumination on ones' negative affect was associated with more symptoms of anxiety. As such, future research should include measures of preoccupying cognitions when examining the relationship between psychopathological / disordered variables and dieters.

OCI-R. We observed a significant difference in OCI-R scores depending upon preoccupation level, with individuals in the high preoccupation group reported significantly more symptoms on OCD. Our results are most likely explained by the similarities between underlying cognitive styles of individuals with obsessive compulsive tendencies, and preoccupation with food, shape and weight. OCD is characterized as having obsessions, (persistent thoughts that generate feelings of anxiety) and compulsions (repetitive mental or physical acts performed with the desire of reducing anxiety) (American Psychiatric Association, 2013). At the core, this aspect of persistent thoughts is reflected by both the questions on the OCI-R (for example: "I am upset by the unpleasant thoughts that come into my mind against my will") and the preoccupying cognitions scale (for example: "Thinking about my shape has interfered with my ability to concentrate"). As such, it appears that both scales tap into this concept of ruminative thinking patterns. This conclusion is supported by literature examining obsessive compulsive tendencies in non-clinical samples. Wahl, Ertle, Bohne, Zurowski, and Kordon (2011) investigated the relationship between a ruminative response style and obsessive compulsive symptomatology in a sample of over 400 non-clinical participants. Tendency to ruminate as measured by the Ruminative Response scale, was positively associated with the severity of obsessive compulsive symptoms, as measured by the revised Padua-Inventory. Authors propose that rumination and obsessive compulsive tendencies are linked through a processual characteristic of intrusiveness, repetitiveness, and difficulty disengaging. In sum, this ruminative style of thinking may underlie

responding on both the OCI-R and the preoccupying cognitions scale. Individuals high in preoccupation endorse a thinking style that is predominantly ruminative, which is reflected through their high endorsement of obsessive compulsive symptomology.

The failure to observe significant differences in dieting groups, despite a significant main effect may be attributable to some groups having smaller Ns. The trend towards significance in our interaction of dieting status and preoccupation is also likely attributable to the smaller Ns of certain combinations of groups. Previous work has found a relationship between OCD symptomology and the presence of clinical eating disorders. Thornton and Russell (1997) administered clinical measures of obsessive compulsive psychopathology to 35 patients with anorexia nervosa, and 33 patients with bulimia nervosa. Overall, 21% met the diagnostic criteria for OCD, and OCD predominantly predated the onset of the eating disorder diagnosis. Milos, Spindler, Ruggiero, Klaghofer, and Schnyder (2002) examined the relationship between OCD comorbidity and eating disorder duration by conducting structured clinical assessments with over 200 female eating disorder patients. Results indicated that OCD was significantly, positively, correlated with duration of the eating disorder.

In sum, our results are important because examining OCD symptomology has been widely ignored in dieters. Our results show that individuals without clinical eating disorders exhibit significant OCD symptomology, which is known to cause individuals distress. Additionally, the significant effect of preoccupation and the trend towards significance in regards to dieting group shows that measuring preoccupation is an important puzzle piece in examining the clinical tendencies of dieters. This suggests that interventions seeking to treat individuals with disordered eating behaviors should include a component that focuses on these ruminative, obsessive thoughts (Clark, 2004).

Cognitive Variables

RBANS. No significant group differences were observed between any of the RBANS indices and dieting group, and/or preoccupation level. Previously, to the author's knowledge, only one previous study assessing preoccupying thoughts among dieters measured general intelligence (Vreugdenburg, Bryan, & Kemps, 2003) and none included a general neuropsychological testing battery. In the study conducted by Vreugdeberg, Bryan and Kemps (2003) sought to examine the effects of weight loss dieting on working memory, paying specific attention to the role of preoccupying cognitions. Participants were 40 females, 20 who identified as dieting to lose weight, and 20 who identified as not currently dieting to lose weight. Participants were given tasks that loaded exclusively on the phonological loop, the visuospatial sketchpad, and the central executive. Participants were also administered The Matrix Reasoning subtest of the Wechsler Adult Intelligence Scales to measure general cognitive ability. Results indicated that there were no significant differences between dieters and non-dieters on the Matrix Reasoning task, thus, suggesting any impairments found on other tasks, were not due to deficits in general cognitive ability.

Our results are in line with that of Vreugdeberg, Bryan, and Kemps (2003) suggesting that any deficit observed in dieters on cognitive task performance is not due to a general deficit. Additionally, our non-significant finding on RBANS indices suggest that any differences between dieting groups, or preoccupation group moving forward in the paper are not attributable to general cognitive functioning deficits.

Random generation. The random generation task is used to engage the central executive, specifically, the central executive's function of inhibiting stereotyped responding. Our sample did achieve randomness, and there were no significant differences between dieters and

non-dieters, which is comparable to the results of Vreugdenburg, Bryan, and Kemps (2003), and Kemps, Tiggemann, and Marshall (2005). This result contributes to the previous literature, as well as the results described in this paper, that the performance of dieters on working memory tasks is likely restricted to those tasks specifically targeting the articulatory control process. However, it should be noted that previous literature using different central executive tasks have obtained different results. For instance, central executive measures which tap into the constructs functions to coordinate performance of two simultaneous tasks, switch attention between two tasks, and manipulate information in long term memory have discriminated between dieters and non-dieters (Kemps et al., 2005).

As such, it may be that dieters have a semi-global central executive deficit, with protection in regards to inhibition of stereotyped responding. Since dieters engage in higher levels of restraint, they may be acclimated to engaging in inhibition. Further, tasks such as dual-task performance, task switching, and activating long term memory may require significantly more effort to coordinate. Thus, one may utilize a subvocal instruction strategy. This verbal component may distinguish these more complicated tasks from the random generation task utilized in the present study.

Mental rotation task. We observed no significant differences between dieting groups, or preoccupation level on mental rotation task performance. In regards to dieting group, this result is in line with previous research. Green and Rogers (1998) who performed seminal work in this area had current dieters and non-dieters perform a battery of working memory tasks including a letter sequence task targeting the phonological loop, the Tower of London Task for the central executive, and the mental rotation task for visuo-spatial sketchpad. Impairments were

found with dieters showing decreased performance for the letter sequence and Tower of London task, but not the mental rotation task.

Kemps, Tiggemann, and Marshal (2005) recruited 32 female dieters, and 32 female non-dieters to investigate the effect of weight loss dieting on cognitive performance, specifically in regards to working memory. Participants completed central executive (double span memory task, random generation, task switching), phonological loop (digit span), and visuo-spatial sketchpad (Corsi blocks) tasks. Participants in the dieting group showed significantly decreased performance on the digit span task, but not the Corsi block task. Dieters and non-dieters recalled a similar amount of blocks, thus suggesting intact functioning of the visuospatial sketchpad.

No previous literature has split groups into high and low preoccupation groups. However, our insignificant result supports the hypothesis of the previous literature of which this work is a continuation of, which is that preoccupying cognitions are predominantly verbal in nature. These preoccupying cognitions, thus, only load (or take up cognitive resources) on the phonological loop, leaving the visuospatial sketchpad unimpaired. The majority of the literature regarding dieting and working memory has shown no visuospatial impairment, our results support those previous works, as well as extend by drawing on independent working memory subsystems (Baddeley, 1992).

Self-schemata: SCEE. It is well established that in individuals with eating disorders there is an undue influence of body weight and shape on self-evaluation (American Psychiatric Association, 2013). The link between self-esteem and shape and weight has been replicated in restrained eaters as well (Morris, Goldsmith, Roll, & Smith, 2001). Previous literature suggests that weight, shape, and food become part of restrained eaters self-schemata. For example, Morris, Goldsmith, Roll, and Smith (2001) had high and low restrained eaters create a schema

map, where they were asked to write down characteristics that they felt were related to their self-identity. Results showed that high restraint participants had greater centrality of weight/food-related concepts and demonstrated a greater association between self-evaluative and weight/food-related concepts. Given the integration of these concepts into one's identity, the SCEE was administered to participants to gain an understanding of how they related food, shape, and weight concepts to the self.

We observed no significant differences between dieting groups on the amount of negative responses given to automatic thought elicit items, but, there was a significant difference between high and low preoccupation groups and negative responses given. Participants categorized into the high preoccupying cognitions group generated significantly more negative responses than the low preoccupying cognitions group. Additionally, we observed no significant differences between dieting groups, or preoccupation groups on the conditional statements. Our results can be interpreted in the framework of explicit and implicit self-esteem. Explicit self-esteem requires "relying on reflective or propositional processes" (Hoffmeister et al., 2010, p.31) and thus be reflective of our conditional items, whereas implicit self-esteem "rely on associative processes" (Hoffmeister et al., 2010, p.31) and are reflective of our automatic items. Hoffmeister et al., (2010) investigated implicit self-esteem and its link to body shape and weight concerns in restrained and non—restrained eaters. The Implicit Association Test was administered to both groups before and after a body awareness induction. Implicit self-esteem decreased significantly for restrained eaters. Important to note, is that explicit self-esteem did NOT change pre to post for either group. The results suggest a self-presentation effect.

Since our automatic items did not require much cognitive effort, responses may have been more in line with how restrained eaters respond on implicit tasks. The conditional items,

being that they require participants to think about what they would do if the situation would arise, may have increased response bias (self-presentation and social desirability). In other words, the conditional items required conscious and reflective construction of self-relevant information. Given such, participants may have become more concerned with their style of responding. In other words, participants believed that there was a "correct" or socially appropriate answer and they responded as such. Along a similar vein, it is possible that there was a disconnect between what participants said they would do, and what would happen in actuality. As such, our results our novel but support the literature linking self-esteem in dieters to food, shape, and weight concept, and point to the importance of assessing self-esteem implicitly.

Verbal working memory.

Phonological similarity effect task dissimilar list. Briefly, the phonological similarity effect task is designed to investigate the storage capacity of the phonological loop (Wilding & Mohindra, 1980). Our results indicated a significant effect of articulatory suppression on recall. When asked to perform a task under articulatory suppression, participants are asked to perform some distracting task while concurrently performing a memory task (Nuget, 2013). For this study, participants were asked to repeat the word "the." The concurrent verbal task, the articulatory suppression, prevents participants from engaging in subvocal rehearsal. This prevention of subvocal rehearsal then impairs recall performance (Baddeley, 1992). Indeed, our results indicated that significantly fewer dissimilar syllables were recalled under the suppression condition than the non-suppression condition. This result was also obtained for phonologically similar syllables - significantly fewer syllables were recalled under the suppression condition than the non-suppression condition. Our results are in line with the results of Shaw and

Tiggemann (2004) who also obtained a main effect of suppression. Notably, these results suggest that articulatory suppression does not exacerbate the phonological similarity effect.

While others have found significant differences between dieters and non-dieters on verbal working memory tasks, our results are in conflict with these findings as no main effect of dieting status emerged (e.g.: Green & Rogers, 1998; Kemps, Tiggemann, & Marshall, 2005). Specifically, Vreugdenberg, Bryan, and Kemps, (2003) who presented the stimuli visually, found that dieters recalled fewer letter strings than non-dieters. We did, however, observed a significant three way interaction of dieting group, preoccupation level, and suppression condition on dissimilar syllable recall. Individuals in dieting group 1, who were also in the high preoccupying cognitions group, recalled significantly fewer syllables than any other combination of groups under no suppression. When scores were examined under suppression, no clear trend emerged. Thus, under no suppression, the preoccupying cognitions of weight loss dieters may significantly interfere with the rehearsal of information. Under suppression, we observed a slight increase in performance for weight loss dieters – however, performance hovered around chance (.6). In summary, weight loss dieters showed a deficit in recall under no suppression as they moved from the low to high preoccupying cognitions category, other groups increased in recall. Under suppression, no significant results were observed, but performance of weight loss dieters increased slightly as they moved from the low to high preoccupying cognitions category. Results may be explained by examining the strategies of individuals within each group for dealing with intrusive, preoccupying cognitions. Those in group 2 may have more effective means of dealing with preoccupying cognitions, suppressing them, compared to those in group 1 – future research should examine this possibility. For the suppression condition, it may be that inducing artificial preoccupation (having participants repeat the word “the”) was cognitively demanding enough

that preoccupation with food, shape, and weight, was not able to intrude on individuals' thoughts and concentration, allowing them to perform similarly to other individuals without preoccupying cognitions about food, shape and weight. This result suggests that only weight loss dieters high in preoccupying cognitions may show a deficit on the phonological similarity effect task. It is important to note that although we used corrections for unequal groups, the non-dieting group, was indeed limited in size.

Literature suggests that mode of presentation may significantly impact performance. Green and Rogers (1998), who did observe significant differences utilized a visual presentation, while Shaw and Tiggemann (2004) who used auditory presentation modality did not. In our experiment, we utilized an auditory modality, as our study was based off of Shaw and Tiggemann's 2004 paper. Presenting participants with the syllable strings verbally may in some way act as a mental crutch which aids in recall.

Additionally, our scoring procedure may have influenced results. Vreugdenberg, Bryan, and Kemps (2003) gave a score of one to any correctly reproduced letter strings, and a score of zero for any errors. This 'all or none' scoring method was different from our approach which utilized the proportion of syllables in the correct position (e.g. if a participant recalled 'C-D-G-T-P' they received a score of .2 because only the first letter was in the correct position).

Finally, our utilization of suppression may have "evened the playing field." Suppression was not utilized in Vreugdenberg, Bryan, and Kemps (2003) who as mentioned above, did find significant differences between dieters and non-dieters. Our utilization of suppression may have mimicked preoccupying cognitions in non-dieters, thus, evening out there performance with that of dieters.

In sum, our results indicate dieters suffer no limitation in actual short-term storage capacity. However, these results warrant caution in interpretation due to the fluctuating results that are obtained depending on presentation modality. Future research should include both presentation modalities, as well as suppression conditions to further investigate this effect.

Word length effect task. The word length effect task was administered to investigate the articulatory control process of the phonological loop. Participants were shown a short list (one syllable words) and a long list (five syllable words) in a randomized order. One of these lists was performed under articulatory suppression. We observed a significant effect of suppression on short and long word recall, with significantly fewer words recalled under the suppression condition than the non-suppression condition. These results are similar to those reported in the previous literature. Shaw and Tiggemann (2004) observed that recall was worse under suppression conditions than non-suppression conditions. Our results did not indicate that performance was impacted by dieting status, dieters and non-dieters performed similarly. This result is in conflict with that of Shaw and Tiggemann (2004) who observed that never dieters scored higher than past dieters and current dieters on the word length effect task.

Notably however, there was significant effect of preoccupation on long word recall. Individuals in the high preoccupying cognition group recalled significantly fewer words than their counterparts in the low preoccupying cognition group. To the author's knowledge, this is the first study which dichotomized individuals into preoccupying cognition groups. As such, this finding is important for several reasons. Preoccupying cognitions should be included in future research pertaining to the neuropsychological/cognitive functioning of dieters. Dieters exhibit significantly higher levels of preoccupying cognitions than non-dieters, and excluding this important characteristic would result in skewed results. Further, this result supports the notion

that preoccupying cognitions significantly disrupt the articulatory control process. In other words, the subvocal preoccupying cognitions interfere with the subvocal rehearsal of the material at hand.

Conclusions.

This study employed a 4(dieting status) x 2(preoccupation) factorial design in order to develop a better understanding of the ways in which dieters' preoccupation with food, shape, weight, and appearance interact with cognitive performance. We specifically investigated the effect of these preoccupations on working memory. Our hypothesis was such: preoccupations with food, shape, and weight, would take on a subvocal form, thus, taxing the cognitive load of an individuals' articulatory loop. We indeed furthered the current understanding of the impact of preoccupying cognitions on cognitive performance, and our hypothesis was partially supported.

Firstly, our results suggest that any differences between the cognitive performance of dieters and non-dieters could not be attributable to general neuropsychological deficits, as indicated by null findings on RBANS performance. To the authors' knowledge, this study was the first of its kind to employ a general neuropsychological functioning test battery.

While no differences were found between dieting groups performance on visuospatial sketchpad loading tasks (mental rotation), the picture was more complex for tasks which loaded on the articulatory loop (phonological similarity effect task, word length effect task). The lack of differences on the mental rotation task supported previous findings (e.g. Kemps, Tiggemann, & Marshal (2005), and additionally, supported the hypothesis that preoccupying thoughts are unlikely to take a visual form. Our results indicated that performance on the word length task (long list) was effected by level of preoccupying cognitions, with those high in preoccupying cognitions recalling fewer words than their low preoccupying cognition counterparts. Again,

these results point to the subvocal nature of preoccupying cognitions, as well as indicating that these thoughts may be distracting. Preoccupying cognitions may disrupt rehearsal of verbal tasks, and thus, undermine performance.

The commonality underlying all findings appears to be preoccupying cognitions. Preoccupying cognitions may operate very similarly to thought patterns found in individuals with clinical affective disorders (depression, anxiety, obsessive-compulsive disorder). At the core, all of these share a ruminative thought pattern. In other words, individuals with depressive, anxious, obsessive tendencies, or preoccupying thoughts about food, shape, and weight, may have difficulty disengaging from these thoughts, and dwell on them. Indeed, previous literature has found a "rebound" effect of thought suppression, where when one tries to push away troublesome thoughts, they come back more persistent and with greater frequency (Wegner, 1987).

Future research should empirically investigate the ruminative nature of preoccupying cognitions regarding food, shape, and weight in dieters and non-dieters. Ruminative thought patterns have been proposed to underlie depressive risk factors, depression, and anxiety (Nolen-Hoeksema, 2000; Spasojević, & Alloy, 2001), and our findings suggest that preoccupation with food, shape, and weight, has a relationship to depression and anxiety. We observed that the preoccupying cognition level was significantly related to disordered eating (DEBQ restraint, emotional eating, and external eating, and lifetime dieting frequency), trait anxiety, scores on the Beck Depression Inventory, and obsessive compulsive symptomology. In each analysis, those high in preoccupying cognitions exhibited significantly increased symptomology. Empirically investigating ruminative thought patterns in relationship to dieting and affective disturbances can assist in the treatment of disorder eating, and chronic dieting. Additionally, it will help us

understand rumination, which seems to underlie multiple pathologies. Further, investigating the temporal nature of preoccupation, dieting, and affective disturbances can help to tweeze apart the causality of factors – right now it is unclear if preoccupation or rumination causes affective disturbances, and dieting respectively, or if dieting and affective disturbances cause preoccupation or rumination respectively. Future research should focus on longitudinal studies, measuring preoccupation, ruminative tendencies, affective disturbances, and dieting.

APPENDIX

Appendix A
Consent form

TITLE: Information Processing In Dieting Females:

PROJECT DIRCTOR: Kelly Cuccolo, Graduate Student
PHONE #: 701-777-2414
DEPARTMENT: Psychology

I am a graduate student in the Department of Psychology at the University of North Dakota. You are invited to participate in a research study investigating information processing, with a look at dieting as a factor. A person who is to participate in the research must give his or her informed consent to such participation. This consent must be based on an understanding of the nature and risks of the research. This document provides information that is important for this understanding. Research projects include only subjects who choose to take part. Please take you time in making your decision as to whether to participate. If you have any questions at any time, please ask.

Approximately 200 students from the University of North Dakota and citizens of the Grand Forks Community will take part in this study. If you join this study, you will be asked about your eating habits, various aspects of your attention and memory. After the completion of the questionnaires administered on a laptop computer, this study will require participation in several short cognitive tasks. The purpose of this research is to examine how dieters' process food and non-food related information.

Your participation in the study will last approximately 75-90 minutes. You may experience frustration that is often experienced when completing surveys and cognitive tasks. Some of the questions may be of a sensitive nature, and you may therefore become upset. However, such risks are not viewed as being in excess of "minimal risk." If, however, you become upset by questions, you may stop at any time or choose not to answer a question. If you would like to talk to someone about your feelings about this study, the UND Counseling Center provides services to UND students and for those that live on campus. You may contact them at 701-777-2127. The Counseling Department also operates a clinic that is available to the Grand Forks community, and can also provide referrals. The Counseling Department can be reached at 701-777-3745.

By participating in this study you will get to experience psychological research first hand, creating a better understanding of the scientific method. We hope that, in the future, other people might benefit from this study because results will provide a better understanding on how dieters process information.

If you are a student at UND, you may receive extra credit for your time for the psychology course of your choice in which you are currently enrolled. If you are a student at UND and choose not to participate in this study you may earn extra credit in your course in other ways. Please ask your instructor, who will provide you with comparable assignments that you may choose to complete (e.g. writing assignments). If you are a student at UND you also have the option to be entered into a raffle for an Amazon giftcard instead of receiving extra credit. If you

are a member of the Grand Forks community you have the option to be entered into a raffle for an Amazon giftcard.

University of North Dakota and the research team are receiving no payments from other agencies, organizations or companies to conduct this research study.

The records of this study will be kept private to the extent permitted by law. In any report about this study that might be published, you will not be identified. Study results will be presented in a summarized manner so that you cannot be identified. Your study record may be reviewed by government agencies and the University of North Dakota Institutional Review Board. The only other people who will have access to the data are the research investigators (Kelly Cuccolo and Richard Ferraro) conducting the study.

No identifying information about participants will be reported or kept. Confidentiality will be maintained by storing your responses in a password protected file and locked file cabinet. Your name is not being collected. Electronic data will be stored on a password protected computer and hard copy data will be stored in a locked file cabinet in the Cognitive Psychology Lab. Data will be stored for a minimum of three years after which it electronic data will be deleted and hard copy data will be destroyed.

Your participation is voluntary. You may choose not to participate or you may choose to discontinue your participation at any time without penalty. Your decision whether or not to participate will not affect your current or future relations with the University of North Dakota.

The researcher conducting this study is Kelly Cuccolo. If you have questions, concerns, or complaints about the research please contact the research advisor, Richard Ferraro at 777-3451 during the day. If you have questions regarding your rights as a research subject, or if you have any concerns or complaints about the research, you may contact the University of North Dakota Institutional Review Board at (701) 777-4279.

_____ _____

Signature of Participant Date

I have discussed the above points with the participant.

_____ _____

Signature of Person Who Obtained Consent Date

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