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THE ANALYSIS OF SELECTIVE INFORMATION PROCESSING
AND NEUROPSYCHOLOGICAL FUNCTIONING
IN INDIVIDUALS AT-RISK FOR EATING DISORDERS:
THE USE OF A PICTORIAL ADAPTATION
TO THE STROOP PARADIGM,
USING PRINT MEDIA ADVERTISEMENTS

by

Kristine L. Lokken
Bachelor of Science, University of North Dakota, 1993
Master of Arts, University of North Dakota, 1998

A Dissertation

Submitted to the Graduate Faculty

of the

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2001

2001
L836

This dissertation, submitted by Kristine L. Lokken in partial fulfillment of the requirements for the Degree of Doctor of Philosophy 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.

Fahad Jeraid
(Chairperson)

Tom Petro

Nancy Vogelton-Hel

James Bodin

Murdi Foster

This dissertation meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

J. N. B.
Dean of the Graduate School

8/27/01
Date

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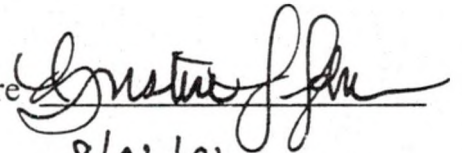
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Department Psychology

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To My Family

ABSTRACT

There is evidence that women with bulimic symptoms are characteristically impulsive and have difficulty inhibiting various behaviors. Neuropsychological profiles of women with bulimic symptoms show patterns of impulsivity, inefficient problem solving ability, and an inability to inhibit irrelevant information. Women with bulimic symptoms also express substantially greater acceptance and internalization of sociocultural mores of thinness, and are more vulnerable to negative influence from laboratory exposure to stimuli representing “thin ideal” stereotypes. The present study examined a possible common link between the characterological and neuropsychological features of women with bulimic symptoms and their susceptibility to negative influence from mass media representations of “thin-ideal” female stereotypes.

A novel card-sorting Stroop paradigm using print media advertisements of “thin-ideal” female models as experimental stimuli and print advertisements of neutrally-rated home furnishings as control stimuli was designed for use in this study. Results of the modified Stroop task administration indicated that women with bulimic symptoms had more difficulty inhibiting irrelevant activated information when it exemplified “thin ideal” media stereotypes, relative to when it exemplified neutrally-rated media information. Specifically, women with bulimic symptoms demonstrated longer card sorting latencies and higher error rates while sorting thin-depicting media stimuli, while women with no or minimal bulimic symptoms did not show this same effect. Results of

this study also indicated that women with bulimic symptoms demonstrated inefficient inhibition in response to the presentation of verbal information with strong semantic associations to eating disorder concerns, and in response to a battery of neuropsychological tasks designed to measure executive function.

Results of this study provide additional converging evidence suggesting that women with bulimic symptoms demonstrate inefficient inhibitory control. The application of the structure building framework (Gernsbacher, 1990) is proposed as a possible explanation of this pattern of inefficient inhibition. Specifically, it is suggested that defective suppression (the inability to inhibit partially activated, irrelevant information) may be the mechanism by which women with bulimic symptoms demonstrate inefficient inhibitory control.

CHAPTER I

INTRODUCTION

Description of Eating Disorders

The two primary eating disorders, as classified by the Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV; American Psychiatric Association (APA), 1994), are anorexia nervosa and bulimia nervosa. Anorexia nervosa is defined by four characteristic features: the presence of an abnormally low body weight (15% below normal body weight for age and height); intense fear of gaining weight or becoming fat; disturbance in the perception of body weight and shape; and amenorrhea (the absence of three consecutive menstrual cycles); (APA, 1994). Two subtypes of anorexia nervosa have been identified: the restricting type, which includes individuals who do not engage in binge-eating or purging behaviors; and the binge-eating/purging type (APA, 1994). Bulimia nervosa is characterized by the following constellation of clinical features: recurrent episodes of binge eating, followed by inappropriate compensatory behavior (such as self-induced vomiting, misuse of laxatives, or excessive exercise) to prevent weight gain; and a self-evaluation based primarily on body shape and weight (APA, 1994). Two subtypes of bulimia nervosa have been identified: the nonpurging type, and the purging type. The diagnosis of bulimia nervosa-nonpurging type includes individuals who primarily engage in nonpurging compensatory behaviors, such as fasting or excessive exercise. The diagnosis of bulimia nervosa-purging type includes

individuals who primarily engage in purging compensatory behaviors, such as self-induced vomiting and misuse of laxatives, diuretics, or enemas. Individuals with bulimia nervosa generally fall within the normal weight range (Beumont, 1995).

Although eating disorders can and do occur in men, both anorexia nervosa and bulimia nervosa are most commonly diagnosed in young women. According to the American Psychiatric Association (1994), more than 90% of cases of both anorexia nervosa and bulimia nervosa occur in females.

The DSM-IV criteria are quite stringent for the diagnosis of anorexia nervosa and bulimia nervosa. For example, in order to meet the diagnostic criteria for bulimia nervosa, the binge eating and inappropriate compensatory behaviors must occur on the average of twice a week for three consecutive months (APA, 1994). Approximately one-third of those presenting for the treatment of an eating disorder do not meet full criteria for either disorder (Fairburn & Walsh, 1995). Those individuals may engage in behaviors very similar to the presentation of anorexia nervosa or bulimia nervosa, but may fail to meet diagnostic criteria either because an essential diagnostic feature is missing ("partial syndrome") or because the disorder is not severe enough to meet the specified threshold ("subthreshold disorder"); (Fairburn & Walsh, 1995). The DSM-IV places partial and subthreshold eating disorders within a single residual category of Eating Disorder Not Otherwise Specified (APA, 1994).

A large number of individuals engage in disordered eating behaviors to a lesser extent. Such individuals may not present clinically for treatment of an eating disorder or are not considered to harbor features of a "clinical syndrome". Depending upon the

degree and type of disordered eating behavior, these individuals may be identified as "at-risk" for the development of an eating disorder.

The mean age of onset for anorexia nervosa is 17 years, with bimodal peaks at 14 and 18 years of age (APA, 1994). Bulimia nervosa generally begins in late adolescence or early adulthood (APA, 1994). Junior high, high school, and college-age females are considered to be most at-risk for the development of eating disorders. Body image and weight concerns begin in girls between the ages of 9 and 11, and increase dramatically as they transition into junior high school (Richards, Casper, & Larson, 1990). Data from a 1987 survey administered to 35,320 seventh to twelfth grade public school students in the State of Minnesota revealed that 30% of female students reported a history of binge eating, 12% reported that they had engaged in self-induced vomiting, 1.9% admitted to laxative abuse, and 1.8% reported diuretic use (Story, French, Resnick, & Blum, 1995). In a separate survey, up to 20% of ninth grade and up to 9% of twelfth grade female public school students reported engaging in vomiting and laxative use within the preceding 30 days in order to lose weight (Minnesota Department of Human Services, 1995). Life transitions often precipitate the development of disordered eating behaviors, and bulimic behaviors often increase in "at-risk" females during the first year of college (Cooper, 1995b).

The prevalence rates of presentations that meet full DSM-IV diagnostic criteria for anorexia nervosa among late adolescent and early adulthood females are between 0.5%-1.0% (APA, 1994). The prevalence rates of presentations that meet full DSM-IV diagnostic criteria for bulimia nervosa among adolescent and young adult females are

approximately 1%-3% (APA, 1994). The prevalence rates of partial and subthreshold eating disorders are estimated to be higher than full syndrome eating disorders in community samples (Bunnell, Shenker, Nussbaum, Jacobson, & Cooper, 1990), and the rates of subclinical disordered eating and related behaviors in college-age women range anywhere from 4%-22% (Collins, Kreisberg, Pertschuk, & Fager, 1982; Pyle, Neumann, Halvorson, & Mitchell, 1982), depending upon method of assessment. There is general agreement throughout the literature that the incidence of anorexia nervosa, bulimia nervosa, and nonspecified eating disorders has dramatically increased in recent decades (Maxmen & Ward, 1995). Eating disorders used to be confined primarily to young, white, upper middle-class females. However, over the past 30 years, anorexia and bulimia have become more "equal opportunity disorders", ignoring racial, ethnic, and socioeconomic boundaries (Harrison & Cantor, 1997)

Eating disorders are associated with significant medical and psychosocial sequelae. Eating disorders have one of the highest rates of premature death among the psychiatric illnesses (Harris & Barraclough, 1998). In a six-year longitudinal study, Norring and Sohlberg (1993) reported the mortality rate to be 17.8% among eating disordered patients, with bulimic patients having two times the risk of premature death of restricting patients in their sample. A significant percentage of the mortality in eating disorders is directly attributable to the medical complications that occur secondary to semi-starvation, chaotic eating, and purging (Kaplan & Garfinkel, 1993). However, causes of death reported for eating disordered patients also include suicide and acute alcohol intoxication (Herzog, Greenwood, Dorer, Flores, Ekeblad, Richards, Blais, &

Keller, 2000). Characteristics correlated with fatalities in eating disorders include: longer duration of illness, presence of bingeing and purging behaviors, comorbid substance abuse, and comorbid affective disorders (Herzog et al., 2000).

Complications of the eating disorders can affect most major organ systems, including: reproductive, gastrointestinal, cardiovascular, endocrine, metabolic, pulmonary, hematological, renal, dermatological, and neurological functions (Pomeroy & Mitchell, 1989). Specific complications reported among eating disordered populations include: ovarian and uterine regression; polycystic ovaries; reduced fertility; delayed gastric emptying; myocardial decompensation with impaired peripheral circulation; anemia, leukopenia, and thrombocytopenia; hypoproteinaemia and impaired liver functioning (Bryant-Waugh & Lask, 1999). Other complications include: impaired skeletal growth and osteoporosis, and cerebral cortical atrophy and ventricular dilation with associated disturbances in both peripheral and central neurological functioning (Bryant-Waugh & Lask, 1999; Pomeroy & Mitchell, 1989). Dehydration and electrolyte imbalances are common, and can be life threatening. Significant and permanent dental enamel erosion can also occur secondary to repetitive vomiting (APA, 1994). Many of the medical complications that occur in eating disordered patients are irreversible.

In addition, high rates of psychiatric comorbidity have been described among eating disordered individuals. Mood disorders, anxiety disorders, alcohol and substance abuse frequently co-exist with eating disorder diagnoses (Bushnell, Wells, McKenzie, Hornblow, Oakley-Brown, & Joyce, 1994). Depression is particularly common among individuals with bulimic symptomatology, with reported rates across studies varying

between 46-89% (Cooper, 1995a; Pope, Hudson, Yurgelun-Todd, & Hudson, 1984). Obsessive Compulsive Disorder (OCD) occurs in a high percentage of eating disordered patients, and patients with comorbid OCD typically exhibit more pathological eating disordered behaviors (Lennkh, Strnad, Bailer, Biener, Fodor, & de Zwann, 1998; Speranza, Corcos, Levi, & Jeammet, 1999). Among patients with anorexia nervosa, between 12 to 18 percent abuse drugs, including alcohol and tobacco (Vastag, 2001). Substance abuse problems are far more common among bulimic patients. According to the National Center on Addiction and Substance Abuse (CASA) at Columbia University, anywhere between 30 to 70 percent of patients with bulimia nervosa abuse or are addicted to drugs (Vastag, 2001).

Eating disorders have also been associated with various Axis II and impulse control disorders (Wonderlich, 1995). Cluster C personality disorders, particularly avoidant and dependent personality disorders, are most common among anorexic individuals, while cluster B personality disorders, including borderline and histrionic personality disorders, are most common among those with bulimia (Diaz Marsa, Carraasco Perera, Prieto Lopez, & Saiz Ruiz, 2000).

As demonstrated, eating disorders are complex syndromes marked by significant morbidity and mortality, and severe medical and psychosocial ramifications. The incidence of anorexia nervosa, bulimia nervosa, and nonspecified eating disorders has increased dramatically among young women in recent years. The course and outcome of an eating disorder is highly variable; however, many patients remain symptomatic even after long-term treatment follow-up (Keel & Mitchell, 1997). Given the complexity and

potential severity of the eating disorders, far more attention is needed in the identification, assessment, treatment, and prevention of these disorders.

Classification of Eating Disorders

The classification of anorexia nervosa and bulimia nervosa remains somewhat controversial. First, there has been much discussion over whether anorexia nervosa and bulimia nervosa qualitatively differ from normal eating, dieting, and weight concerns, or if the two disorders fall at the extreme end of a continuum of eating behavior (Lowe, Gleaves, DiSimone-Weiss, Furgueson, Gayda, Kolsky, Neal-Walden, Nelsen, & McKinney, 1996). Preoccupation with weight and shape, body dissatisfaction, and dieting are so pervasive among females today that some authors have coined the term “normative discontent” in reference to women’s concerns about weight (Rodin, Silberstein, & Striegel-Moore, 1985). Differentiating normative weight concerns from more serious symptoms of eating disorders has been one of the challenges in eating disorder research.

Second, there remain questions over whether anorexia nervosa and bulimia nervosa are qualitatively different disorders, or whether they are variations on a continuum of a single disorder (Gleaves, Lowe, Green, Cororve, & Williams, 2000). With the addition of the subtype of binge-eating /purging anorexia in the most recent revision of the Diagnostic and Statistical Manual (DSM-IV; APA, 1994), this issue has been a topic for even more debate.

Regarding the first issue, there are two perspectives on the relationship between dieting behaviors and the development of eating disorders. The continuity model

suggests that eating disorders are extreme manifestations of dieting behaviors and weight concerns common among women (Hsu, 1990). The discontinuity model suggests that dieting and weight concerns are central to the development of eating disorders; however, only individuals with other predisposing characteristics will actually develop an eating disorder syndrome, i.e. individuals with eating disorders qualitatively differ from individuals with normative dieting behaviors and weight concerns (Bruch, 1973).

Past research has examined models of continuity and discontinuity in the eating disorders through the comparison of symptoms between unrestrained eaters, restrained eaters, and individuals with bulimia nervosa. Trends of increasing symptoms of eating restraint and weight concern have been found when comparing unrestrained eating to restrained eating to the syndrome of bulimia, providing evidence for the continuity hypothesis (Rossiter, Wilson, & Goldstein, 1989). However, such trends have not been observed on measures of personality, general psychopathology, and binge eating. On such measures, unrestrained eaters and restrained eaters were quite similar to each other, but differed significantly from those with bulimia (Lowe et al., 1996, Rossiter et al., 1989). This suggests bulimic individuals differ qualitatively on measures of personality, general psychopathology, and binge eating, and provides supporting evidence for the discontinuity hypothesis.

Other studies have relied on taxometric methods as the basis of discrimination between the continuity and discontinuity models of eating disorders (Gleaves, Lowe, Green, et al., 2000; Gleaves, Lowe, Snow, Green, & Murphy-Eberenz, 2000). Such studies have found that binge eating and compensatory behaviors clearly discriminated

between bulimic groups and nonclinical comparison groups on the basis of taxonicity (discontinuity); (Gleaves, Lowe, Snow, et al., 2000). Other characteristics such as drive for thinness, body dissatisfaction, and restrictive eating, in the absence of binge eating or other compensatory behaviors, were found to be more indicative of dimensionality (continuity); (Gleaves, Lowe, Snow, et al., 2000). These findings are inconsistent with a strict continuum model of eating disorders, and suggest that binge eating and compensatory actions differentiate between bulimia nervosa and normative eating, dieting, and weight concerns. Overall, results of studies examining the continuity or discontinuity of eating disorders with normative types of eating, dieting, and weight concerns seem to support the notion that experiences of persons with bulimic symptoms are qualitatively different from those of persons with nonclinical weight concerns. It is still unclear whether anorexia nervosa taxonomically differs from normative dieting.

Regarding the second issue, there has also been much debate in the literature over whether anorexia nervosa and bulimia nervosa are qualitatively distinct disorders, or merely variations on a single continuum. Russell (1979) was the first to describe the phenomenon of bulimia nervosa. Russell (1979) described bulimia nervosa as a “variant” of anorexia nervosa, and cautioned that it was premature to think of bulimia nervosa as constituting a distinct disorder, separate from anorexia nervosa. The belief that bulimia nervosa was a variant of anorexia nervosa was primarily based on the observation that many bulimic patients were restricting anorexics prior to developing binge eating/purging behaviors. In addition, Russell (1979) also noted several shared features between the two conditions, such as fear of fat and body size distortion. Since this time, clinical and

research literature has reported many similarities and differences between the two disorders. The DSM, which is based on a categorical classification system, has classified anorexia nervosa and bulimia nervosa as two separate disorders; however, there is little reported theoretical justification for this categorization.

Using data from 745 eating disordered inpatients, Gleaves, Lowe, Green, and colleagues (2000) set out to investigate whether anorexia nervosa and bulimia nervosa do indeed differ categorically. Using taxometric methods, the authors found evidence that both purging and nonpurging bulimia nervosa qualitatively differed from restricting anorexia nervosa. There was also evidence in this same study that restricting anorexia nervosa and binge-eating/purging anorexia nervosa differed qualitatively (Gleaves, Lowe, Green, et al., 2000). In addition, binge/purge anorexia nervosa seemed to fall on a continuum with both nonpurging and purging bulimia nervosa (Gleaves, Lowe, Green, et al., 2000). Results of this study suggest that anorexia nervosa, restricting type, differs qualitatively from the other types of eating disorders, and that anorexia nervosa, binge-eating/purging type is more similar to bulimia nervosa than to the restricting type of anorexia nervosa. These findings suggest that there is a commonality among patients who engage in binge eating and compensatory behaviors, independent of other eating disorder characteristics.

Taken together, the aforementioned findings suggest that there is something unique among individuals that engage in binge-eating and compensatory behaviors that separates them from individuals with restricting anorexia and individuals with normative eating, dieting, and weight concerns. These findings suggest behaviors such as binge

eating and compensatory purging/nonpurging may serve as identificatory features of women who are at-risk for the development of an eating disorder, specifically bulimia nervosa and anorexia nervosa-binge eating/purging type.

These findings are also interesting, in that binge eating and purging behaviors have been associated with a number of other psychopathological characteristics, including impulsivity, substance abuse, promiscuity, and general psychopathology (Gleaves, Lowe, Green, et al., 2000). For example, DaCosta and Halmi (1992) found that binge/purging anorexics were more impulsive, socially inappropriate, sexually active, and reported more family dysfunction than restricting anorexics. Lowe and Eldredge (1993) reported that anorexic binge eaters engaged in more drug and alcohol use and were more promiscuous in comparison to restricting anorexics and other psychiatric patient groups. Vandereycken and Pierloot (1983) reported anorexics that binged/purged were more likely to engage in stealing and self-mutilation. It has also been frequently noted that individuals with bulimia nervosa engage in a high number of impulsive behaviors, including alcohol abuse, substance misuse, gambling, shoplifting, and self-harm (Maxmen & Ward, 1995; Penas Lledo & Waller, 2000).

These findings are of particular importance for future studies examining the eating disorders. It seems that binge-eating and purging/nonpurging compensatory behaviors may differentiate between individuals "at risk" for an eating disorder and those with normative weight concerns. In addition, it appears that binge purge anorexics and bulimics uniquely differ from restrictive anorexics in terms of personality and behavioral

characteristics. This may indicate that the restrictive anorexics should be studied separately from individuals that engage in binge-purge behaviors.

Etiological Explanations of Eating Disorders

There is a large body of literature dedicated to the analysis of the development and maintenance of eating disorder syndromes. As with other psychological phenomenon, it is likely that the etiological factors involved in eating disorders are multidetermined and multifactorial, and it is unlikely that any one factor can distinguish between those who will develop an eating disorder and those who will not. According to a model discussed by Cooper (1995b), the development of an eating disorder depends on the occurrence of circumstances (albeit biological, environmental, or social), which activate an individual's vulnerability to certain predisposing (risk) factors. Such factors occur before the actual onset of the disorder, and can increase the chances of developing the disorder. Certain behavioral precursors (such as dieting) may then combine with precipitating factors (events) and in turn lead to the onset of a disorder (Cooper, 1995b). See Figure 1.

When the two eating disorders (anorexia and bulimia) are considered together, various authors have suggested that certain psychological features (perfectionism, general dissatisfaction, low self esteem, body dissatisfaction/body distortion, history of sexual abuse), biological factors (genetic predisposition, neurotransmitter imbalance, childhood obesity, pubertal weight gain), behavioral factors (restrictive eating/dieting), and familial and sociocultural factors (negative parental attitudes about weight and eating, peer

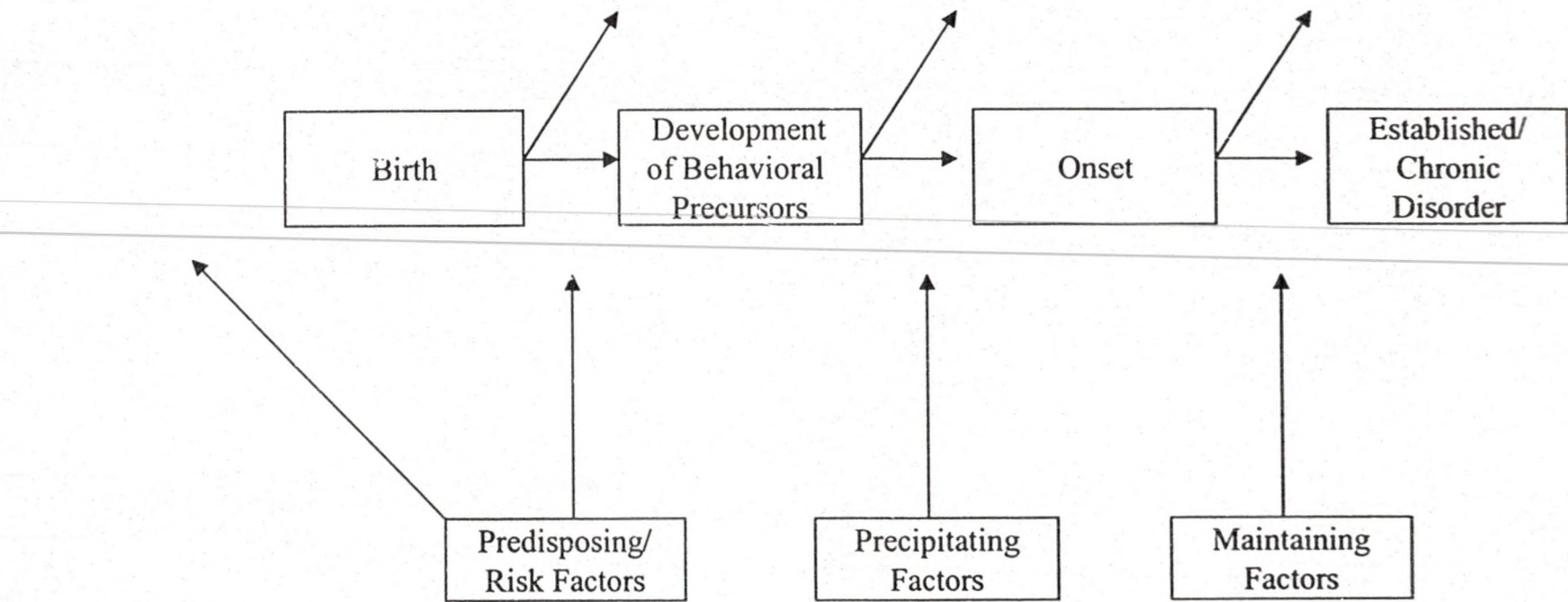


Figure 1. Stages in the development and maintenance of eating disorders (Cooper, 1995).

pressure regarding weight, media images) can all increase the risk of setting conditions necessary for the development of eating disorders (White, 2000).

Following the onset of a disorder, certain maintaining factors interact with protective factors, establishing whether the disordered behaviors cease, or continue to develop into a chronic disorder (Cooper, 1995b). Using this model, the proposed etiology of eating disorders is highly heterogeneous. It is likely that a complex interplay of factors and processes over time will ultimately determine an individual's vulnerability to and development of an eating disorder. (Cooper, 1995b).

Historically, etiological examinations of the eating disorders have focused primarily on intra-psycho conflict and familial patterns of interaction; however, the recent rise in the incidence of eating disorders among young women has led researchers to examine anorexia nervosa and bulimia nervosa from a broader range of perspectives. Primary etiological explanations for the development of eating disorders reflect psychodynamic, family systems, behavioral, and biological theories. Sociocultural influences and precipitating and maintaining cognitions are generally discussed within the context of behavioral theory. Neurobiological, neuroanatomical, and neurobehavioral influences are generally discussed within the context of biological theory.

There are two main criticisms of the etiological research on eating disorders to date. First, much of the research in this realm fails to distinguish between the disorders of anorexia nervosa and bulimia nervosa, or their subtypes, in the consideration of etiological factors. Second, although etiological explanations of the eating disorders abound, very rarely are the inter-relationships between the separate etiological

explanations discussed, nor is there an attempt to place the explanations within an inclusive model, such as the one proposed by Cooper (1995b). This section will focus on a discussion of the primary etiological explanations for the development and maintenance of eating disorders. This discussion will provide a background for the current study, particularly through the presentation of contemporary etiological explanations in the eating disorder research (the sociocultural model and the neurobiological/neurobehavioral model).

Psychodynamic and Family Systems Theories

Traditional psychodynamic theorists view anorexia and bulimia as the ego's defensive reaction to "oral impregnation" fantasies (Williamson, Barker, & Norris, 1993). Other psychodynamic theories emphasize control and individuation issues, postulating that starvation and control over body size serve to reduce feelings of powerlessness as young women approach puberty (Williamson et al., 1993). Freud speculated that eating can be a substitute for sex. Based on this idea, it was suggested that the refusal to eat (anorexia) stems from an adolescent's anxiety about emerging sexuality issues (Ross, 1977).

Family-systems theorists purport that families with eating disordered members harbor traits of enmeshment, overprotectiveness, rigidity, marital disharmony, and poor conflict resolution (Williamson et al., 1993). Parents of anorexic individuals have been reported to be overbearing, ineffective, and intrusive (Maxmen & Ward, 1995). Bulimic families appear enmeshed but disengaged (Maxmen & Ward, 1995). A study by Johnson and Flach (1985) comparing 105 bulimic families to 86 control families, found that the

rules and overall structure of bulimic families resembled those of the control families; however, bulimic families were more disorganized, showed poor problem solving ability, and had difficulty managing crises. In addition, the authors reported that bulimic families tend to set high expectations, but show little concern for their children's activities. It has been reported elsewhere that eating disordered patients whose parents showed a lack of concern exhibit more severe bulimic symptoms (Williamson et al., 1993).

Parental attitudes have also become a focus of family research. Studies have shown that parental modeling of weight concerns and disordered eating behaviors, along with negative parental comments about weight, shape, and eating significantly affect body dissatisfaction and weight concerns among adolescents (Schwartz, Phares, Tantleff-Dunn, & Thompson, 1999).

Behavioral Theories

Several behavioral theories have been proposed outlining the etiology of eating disordered pathology. One such behavioral theory purports that fear of weight gain is a primary motivating variable in the development and maintenance of eating disordered behavior. Behaviors that achieve and maintain thinness are negatively reinforced by removal of the fear of becoming fat. In this behavioral model, anorexia and bulimia are conceptualized as "weight phobias" (Williamson et al., 1993).

In a further analysis of this model, it is interesting to note that approximately one-half of anorexic patients and most bulimic patients tend to alternate between a pattern of restrictive eating and bingeing-compensatory behavior (Fairburn & Cooper, 1982). The fear of gaining weight may serve as motivation to engage in restrictive eating patterns;

however, dietary restraint may ultimately result in an obsession with food, leading to the urge to overeat or binge. Overeating will cause immense anxiety, and engaging in compensatory behaviors (i.e. nonpurging or purging) will again serve to reduce anxiety associated with weight gain. The fear of gaining weight serves to perpetuate this cycle of behaviors (Williamson et al., 1993).

Laboratory findings yield corroborating evidence for the “weight phobia” model of eating disorders. Bulimic women report increased subjective ratings of anxiety after eating, and decreased subjective anxiety ratings after purging (Jarrell, Johnson, & Williamson, 1986). Bulimic women also report increased levels of anxiety upon eating a large meal after which they were not allowed to purge (Leitenberg, Gross, Peterson, & Rosen, 1986).

A second behavioral theory outlining the etiology of eating disorders adopts the framework of Social Learning Theory (Bandura, 1977). Using this theory as a framework, it has been proposed that the presence of identificatory role models in the mass media may provide a theoretical means by which young women internalize the pursuit of thinness (Stice, Schupak-Neuberg, Shaw, & Stein, 1994). External incentives, such as social acceptance, may mediate the eating disordered behavior.

Taking Social Learning Theory to a broader, more encompassing perspective, the sociocultural model suggests that eating disorders develop in response to society’s increasing emphasis on thinness as a measure of beauty and success (Raphael & Lacey, 1992). Research suggests this social norm is applied more strongly to women than to men. For example, in a study examining gender differences in body weight, the

condition of being overweight had more detrimental consequences for women than for men (Stake & Lauer, 1987). Overweight women reported having few relationships with men, poor quality relationships with men, decreased self-esteem, and over-preoccupation with body weight and size (Stake & Lauer, 1987). Fontaine (1991) reported the condition of being overweight is more loathed in women than in men.

In response to these societal consequences, it isn't too surprising that average weight women show the same amount of concern about their weight as overweight men (Stake & Lauer, 1987), and that women indicate significantly greater dissatisfaction with their bodies than men (Mintz & Betz, 1986). Women are also more likely to perceive themselves as overweight or slightly overweight, regardless of their actual weight, and most women report that they would like to lose weight (Mintz & Betz, 1986). These differences may provide an explanation for the gender discrepancy in the prevalence of eating disorders.

It appears that women diagnosed with eating disorders are more likely to be influenced by the high value placed on thinness and the stigmatization of obesity. Studies have found that bulimic women express substantially greater acceptance and internalization of sociocultural mores about thinness and attractiveness than nonbulimic women (Striegel-Moore, Silberstein, & Rodin, 1985). In addition, women diagnosed with eating disorders aspire to be a thinner body size than women without eating disorders (Williamson, Kelley, Davis, Ruggiero, & Blouin, 1985), and women who endorse a high level of bulimic symptomatology report higher perceived pressure to be thin (Irving, 1990). Although there are several different mechanisms through which the

thin-ideal is communicated to women, research suggests one of the strongest transmitters is the mass media. In a study conducted by Irving (1990) college women reported experiencing the greatest amount of pressure to be thin from the media, followed by pressure from peers, and finally, pressure from family members.

It is speculated that the use of thin female models by the mass media may play a role in the increasing incidence of eating disordered behaviors in young women. The increase in eating disorder pathology over the last several decades has coincided with a decrease in women's ideal body weight, as portrayed by the mass media (Stice et al., 1994). In an historical examination of American advertising, Percy and Lautman (1994) reported that in 1894, the ideal female model was 5 foot 4 inches, and weighed 140 pounds. Models were first "slimmed down" in 1947, weighing in at an average of 125 pounds. In 1970, an average model was 5 foot 8 inches and weighed a mere 118 pounds. Although there is no known documented evidence confirming the continuation of this trend into the 21st century, there is speculation that the cultural ideal is getting progressively taller and thinner.

Garner, Garfinkel, Schwartz, and Thompson (1980) documented and quantified the shift towards a thinner ideal shape over a 20-year period from 1959 to 1978. Using data from Playboy centerfolds and Miss America Pageant contestants, they found a significant decrease in percent of average weight for age and height in these women over the 20-year period. This trend corresponded with an increase in the average weight of a normative sample of young women.

Wiseman, Gray, Mosimann, and Ahrens (1990) continued the Garner et al. (1980) investigation by examining body measurements of Playboy centerfolds and Miss America Pageant contestants between the years of 1979-1988. Results showed that both centerfolds and pageant contestants exhibited a significant decrease in weight over the nine-year period, and both centerfolds and contestants had body weights 13-19% below expected norms. Garner et al. (1980) pointed out the irony of this cultural reality: "the current symbols of sexual attractiveness may be gravitating toward a weight that is in biological opposition to normal reproductive activity" (pg. 490).

In lieu of this trend, it is interesting that exposure to "thin ideal" media has been highly correlated with the expression of eating disorder symptomatology. Harrison and Cantor (1997) found that for women, higher levels of "thin-ideal" media use predicted eating restraint, bulimic symptoms, drive for thinness, and body dissatisfaction. Abrahamson and Valene (1991) reported significant correlations between media usage and eating restraint and media usage and bulimic behaviors.

Other studies have attempted to experimentally manipulate and quantify the effects of "thin ideal" media exposure in laboratory settings (Hamilton & Waller, 1993; Irving, 1990; Stice & Shaw, 1994; Waller, Hamilton, & Shaw, 1992). Irving (1990) found that women exposed to slides of thin models reported lower levels of self-esteem and weight satisfaction than did women exposed to average and oversized models. Stice and Shaw (1994) demonstrated that undergraduate females reported feelings of body dissatisfaction, depression, stress, guilt, shame, and insecurity after only three minutes of exposure to slides of thin models from popular fashion magazines. Subsequent analyses

from that study indicated that negative affect, body dissatisfaction, and subscription to the thin-ideal predicted bulimic symptoms.

Hamilton and Waller (1993) found that women with anorexia nervosa and bulimia nervosa demonstrated significant increases in body size overestimation (25% above usual overestimation) after only six minutes of exposure to pictures of thin models from popular fashion magazines. This effect was not found when the eating disordered patients were exposed to pictures of neutral stimuli from magazines dedicated to beautiful homes. In a subsequent study, Waller, Hamilton, and Shaw (1992) found that this vulnerability to thin-depicting media images was not limited to women diagnosed with anorexia and bulimia. The authors reported that body size overestimation was also present in non-eating disordered women, and was strongly associated with the degree of abnormal eating attitudes. The authors concluded that women who engage in any sort of unhealthy eating practices are less resilient to thin depicting media influence.

Heinberg and Thompson (1995) attempted to extend these findings to televised media images. Their experimental group consisted to 70 women who were asked to view a ten-minute tape containing twenty, 30-second appearance related commercials with actresses who epitomized the thin ideal. The control group consisted of 67 women who were asked to view nonappearance related commercials with actresses of average or above-average weight. Individuals who endorsed high levels of bulimic symptoms and sociocultural internalization became significantly more depressed and angry following exposure to the appearance related videotape depicting actresses who epitomized the thin ideal.

In summary, it seems there is a strong association between consumption of and exposure to thin ideal depicting media and the expression of eating disorder symptomatology. Although all women seem to be affected by thin depicting media images to some degree, women diagnosed with eating disorders and women endorsing unhealthy eating practices seem to be most affected.

The results of a study by Baker, Sivyer, and Towell (1998) provide further support for the importance of the visual media in promoting eating disordered attitudes and behaviors. In the Baker et al. (1998) study, the authors administered two questionnaires, the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) and the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), to 60 women. Twenty women in the study were congenitally blind, 20 women were blinded later in life, and 20 women were sighted. Results indicated that congenitally blind women had higher body satisfaction scores and more positive eating attitudes in comparison to women blinded later in life and sighted women. Women blinded later in life reported significantly higher levels of body image dissatisfaction and disordered eating attitudes than congenitally blind women, but significantly lower levels than sighted women. The authors concluded that the ability to visualize the self and others seems an integral component to the development of eating disordered symptoms. From a sociocultural perspective, this suggests that the visual overrepresentation of slender and attractive images of females in the media may have a strong impact on sighted women. "Thin-ideal" media images may serve as exemplars from which young women make comparisons and self-evaluations.

Although there is much speculation that media images of ideal body types contribute to eating disordered pathology in women, the correlational nature of this research precludes any firm conclusions. To date, no studies have been able to demonstrate a direct cause-and-effect relationship between thin depicting media exposure and the development of eating disorder symptomatology. Furthermore, most American women are exposed to a plethora of thin images in the media every day, but only a small proportion develop clinical eating disorder syndromes. If a causal link did exist between thin depicting media exposure and eating disorder pathology, one would expect a significantly higher percentage of women presenting with clinical eating disorder syndromes.

The speculation that thin-ideal media images play a role in the development of eating disorders runs parallel to the argument that violent media play a role in the development of aggression in children. Although both arguments have supporters and credence, media effects are likely only part of a myriad of possible influential variables in the development and expression of certain pathologies (Barrett, 1997).

The aforementioned studies do provide a preponderance of evidence associating thin representations of women in the media with the expression of eating disordered pathology. It seems more likely, however, that exposure to thin-depicting media stimuli serves to maintain and worsen characteristic eating disorder symptoms in women already demonstrating abnormal eating attitudes and patterns (Hamilton & Waller, 1993; Waller et al., 1992). It has been reported that women with disordered eating express substantially greater acceptance and internalization of sociocultural mores of thinness and

attractiveness (Striegel-Moore, et al., 1985), and it appears these same women are also most vulnerable to negative reactions to "thin ideal" media messages (Hamilton & Waller, 1993; Heinberg & Thompson, 1995; Waller et al, 1992). Perhaps there are other variables characteristic to women with eating disorders that contribute to this pattern of susceptibility to media/sociocultural messages. It is important for future studies to attempt to identify potential mediating and moderating variables that interact with media exposure to produce this effect.

Biological Theories

Eating disorders are sometimes amenable to psychotherapeutic intervention; however many cases respond minimally to treatment and there is high relapse potential following treatment (Ferguson & Pigott, 2000). This has led some researchers to seek biological explanations for the development of eating disorders. Biological theories provide evidence of genetic, neurobiological, neuroanatomical, and neurobehavioral involvement in the syndromes of anorexia and bulimia.

Genetic

The high incidence of eating disorders among relatives has led to twin studies exploring a possible genetic basis of the disorder. Genetic studies suggest that both anorexia and bulimia tend to run in families; however the specific nature of the genetic diathesis may differ (Gleaves, Lowe, Green, et al., 2000). A meta-analysis of twin studies of patients with anorexia nervosa reported a 35-55% concordance rate for monozygotic twins, and an 11% concordance rate for dizygotic twins (Nowlin, 1983).

The relatively high concordance rate of anorexia in monozygotic twins is interesting, given that anorexia is rare in the general population (less than 1%).

There appears to be a specific risk for anorexia in families of anorexic probands, with familial incidence studies of anorexic patients indicating that first-degree relatives are six times more likely to develop the disorder. However, for bulimic probands there is a generalized predisposition in relatives towards substance abuse, impulse disturbance, affective disorders, and obesity (Herzog, 1982; Strober, Salkin, Burroughs, & Morrell, 1982). In a study by Strober et al. (1982), alcoholism was reported to be present in 33% of parents of bulimics, and fathers of binge-purge anorexics were three times as likely to be alcoholic than fathers of restricting anorexics. Mothers of bulimics had a higher incidence of obesity (Strober et al., 1982).

Neurobiological

Neurobiological findings have implicated a variety of metabolic, physiologic, and neuroendocrine disturbances in the pathology of eating disorders. However, it is often difficult to discern if these disturbances contribute to, or are a consequence of, eating pathology. The dysregulation of acetylcholinergic, monoaminergic, serotonergic, dopaminergic, and gamma-amino butyric acid (GABA) systems have been implicated in the regulation of eating behavior (Demitrack, Szostak, & Weingartner, 1992). Data from animal models suggest that the neurotransmitter norepinephrine activates eating behaviors, while the neurotransmitter serotonin inhibits eating behaviors. Laboratory findings provide considerable evidence of the dysregulation of serotonergic processes in the eating disorders. In comparison to age- and sex- matched controls, women with

active bulimia nervosa demonstrated evidence of decreased cerebrospinal fluid (CSF) serotonin activity; while women with active anorexia nervosa demonstrated elevated indices of CSF serotonin activity (Kaye, Greeno, Moss, Fernstrom, Fernstrom, Lilienfeld, Weltzin, & Mann, 1998; Kaye & Weltzen, 1991). Treatment response to antidepressant drugs, including tricyclics, monoamine oxidase inhibitors, and serotonin uptake blockers support the involvement of various neurotransmitter systems in the pathology of eating disorders (Wilson & Pike, 1993).

Patients with anorexia or bulimia nervosa often demonstrate evidence of abnormal neuropeptide activity or neuroendocrine function. Neuropeptides are known to play an important role in feeding behaviors. Bulimic individuals have been shown to have high concentrations of CSF neuropeptide PYY (Kaye, Gendall, & Kye, 1998). It is thought that elevated central PYY activity may be responsible for the uncontrollable bingeing behavior in bulimic individuals. Although neuropeptide disturbances do not appear to be permanent features of, or causal mechanisms for the development of eating disorders, these disturbances may exaggerate certain behavior characteristics of the disorders (Kaye, Gendall, & Kye, 1998).

Elevated concentrations of vasopressin have been reported in subjects with OCD, anorexia nervosa, and bulimia nervosa (Demitrack et al., 1992). It is speculated that elevated vasopressin activity may enhance the expression of obsessional features shared among these three disorders. Specifically, metabolic changes involved in the increased secretion of vasopressin may bias an individual toward a narrowing of cognitive focus

and a perseverative awareness of particular thoughts (Gold, Kaye, Robertson, & Ebert, 1983).

Neuroanatomical

Since the early 1970's, several studies have cited a number of "soft signs" of organic disease in eating disordered patients. Evidence of perinatal brain injury in samples of patients with eating disorders is significantly high (Halmi, Goldberg, Eckert, Casper, & Davis, 1977). Lankenau and colleagues (1985) found 38% of anorexic patients had suffered some form of central nervous system (CNS) insult prior to their diagnosis. Artmann, Grau, Adelman, and Scheiffer (1985) found that approximately 60% of an anorexic patient sample exhibited evidence of early acquired (perinatal) brain damage on computerized tomography (CT) scans. Many of the anorexic patients in this sample also reported experiencing obstetric complications at the time of their birth, including: difficult labor; premature birth; low or high birth weight; maternal alcoholism; and above average maternal and paternal age. The number of such complications corresponded to the severity of the prognosis in the anorexic patient sample.

Electroencephalogram (EEG) abnormalities, including abnormal slowing and spike wave discharges have been reported at high rates in eating disorder populations (Braun & Chouinard, 1992). Lateralization trends suggest primarily right-sided hemispheric involvement of EEG abnormalities in both anorexic and bulimic patients (Braun & Chouinard, 1992). However, a review by Pope, McElroy, Keck, Hudson, Ferguson, and Horne (1989), reported that more methodologically sound studies were needed before any firm conclusions could be drawn.

Other studies using CT scans with eating disordered patients have revealed a significant occurrence of brain abnormalities (Heinz, Martinez, & Haenggeli, 1977; Palazidou, Robinson, & Lishman, 1990). Brain CT scan studies of patients with anorexia nervosa consistently report sulcal widening and/or lateral and third ventricle enlargement (Braun & Chouinard, 1992). Enlargement of the external cerebrospinal fluid spaces has been the most consistent neuroradiological abnormality demonstrated in eating disorder patients (Dolan, Mitchell, & Wakeling, 1988; Enzmann & Lane, 1977; Heinz et al., 1977; Kohlmeyer, Lehmkuhl, & Poutsas, 1983; Krieg, Backmund, & Pirke, 1986; Lankenau et al., 1985; Palazidou et al., 1990). The nature of the abnormal CT findings is unclear. Some authors attribute the findings to be associated with the illness process, resultant from the effects of malnutrition and dehydration. These authors describe the findings as "pseudotrophy", speculating reversibility of abnormalities upon renourishment (Krieg, Lauer, & Pirke, 1987). However, studies with anorexic individuals reported little reversibility of brain atrophy on follow-up scans after the completion of renourishment programs, and there have been no reported cases where brain scans returned to perfect normality at follow-up (Braun & Chouinard, 1992).

Other authors cite the work by Reveley, Reveley, Chitakara, and Clifford (1984), in that cerebral ventricular size may be genetically determined. This may suggest that a number of factors, including heredity, obstetric complications, birth injury, and exposure to toxic substances, may predetermine ventricular size. With this in mind, it is unclear whether the abnormal CT findings in patients with eating disorders might contribute to the development of the disorder, or whether they are a consequence of the pathology.

Very few investigations have been published on metabolic brain imaging in eating disordered patients (Emrich, Pahl, Herholz, Pawlik, Pirke, Gerlinghoff, Wienhard, & Heiss, 1984; Herholz, Krieg, Emrich, Pawlik, Beil, Pirke, Wagner, Wienhard, Ploog, & Heis, 1987; Rooney, Lark, & Buschbaum, 1988; Wu, Hagman, Buschsbaum, Blinder, Derrfler, Tai, Hazlett, & Sicotte, 1990). Most of the sample sizes involved in the studies have been very small, ranging from 5-12 subjects, and the findings are inconsistent. However, one study found significant bilateral caudate hypermetabolism in anorexic patients during the anorectic state in comparison to young male normals (Herholz et al., 1987). Another study found caudate hypometabolism in bulimic patients (Rooney et al., 1988). Emrich and colleagues (1994) reported a trend towards elevated metabolism of the frontal cortex in anorexic patients; however, this finding was not significant.

Nozoe, Naruo, Yonekura, and Nakabeppu (1995) used single photon emission computed tomography (SPECT) to examine regional cerebral blood flow in five patients with bulimia nervosa and eight patients with anorexia nervosa, and compared them with nine healthy controls. SPECT examinations were performed before and after food intake. Results of this study showed bulimic patients had significantly higher regional cerebral blood flow values in the bilateral inferior frontal and left temporal regions before food intake. Anorexic patients showed significantly lower regional cerebral blood flow values in the left parietal region before food intake. There were no significant differences among the three groups after food intake.

Generally, the hypothalamus is cited as the structure most involved in the regulation of eating behavior (Leibowitz, 1995). However, the disease processes of

anorexia nervosa and bulimia nervosa do not necessarily involve the loss of appetite or decreased satiety, but are primarily driven by a set of attitudes, beliefs, and perceptions from which the eating disorder develops (Braun & Chouinard, 1992). In addition, Grossman (1975) reported that hypothalamic regulation of appetite and eating behavior is often secondary to the role that the frontal lobes and their distributed circuitry play. Disruption in the connections between the frontal lobes and their circuitry has led to several reported cases of acquired hyperphasia (overeating) and bulimic behaviors (binging and purging). For example, patients who underwent frontal lobotomies for the treatment of intractable psychoses developed extreme hyperphasia (Hofstatter, Srnolik, & Busch, 1945). A case report by Erb, Gwirstman, Fuster, and Richeimer (1989) discussed the development of extreme bingeing and purging episodes in a patient who sustained a frontal periventricular white matter infarction. Bulimic behaviors were also noted in a patient with a frontal lobe tumor (Hecaen, 1964). Kirschbaum (1951) reported hyperphasia in a patient with a midline frontal tumor, and Drake (1987) reported hyperphasia in a patient following bilateral frontal infarctions. These findings suggest that frontal cortical tissue loss, particularly in the frontal poles, consistently produces hyperphasia and may play a key role in the development of bulimic behaviors.

The frontal lobes have been implicated in the study of virtually every class of psychiatric illness. Frontal system pathways play a discrete role in motor functions, and thus provide the final common pathway for all behavior. In as such, Malloy and Duffy (1994) assert that any disturbance in thought or behavior is generally expressed via frontal functions.

The neurobehavioral model of dysregulation or dysfunction of the frontal lobes has been used to explain various psychiatric disorders, including obsessive compulsive disorder, affective disorders, and impulse control disorders. Specific neurobiological parallels have been documented between the eating disorders and unipolar depression, and the eating disorders and obsessive compulsive disorder, including: similar neuroendocrine abnormalities, similar alterations in neurotransmitter systems, and similar treatment response to antidepressant medication (Irwin, 1993). The co-morbidity of unipolar depression, OCD, and impulse control disorders in individuals with eating disorders, specifically bulimia nervosa, suggests a possible common psychobiological basis between these disorders. However, to date, there has been no known attempt to implicate frontal lobe dysfunction in the nosology of eating disorders.

At least two functional and anatomical subdivisions of the human prefrontal cortex have been identified. The dorsolateral (DL) prefrontal system has extensive connections with secondary association areas and is primarily involved in the integration of multimodal sensory information (Malloy & Duffy, 1994). The orbitomedial (OM) prefrontal system connects with limbic structures in the cingulate and anterior temporal lobes, and is thought to be involved in the modulation of emotional expression and the evaluation of environmental input (Malloy, 1987). Lesions to these two areas of the prefrontal cortex result in distinct cognitive, behavioral, and personality characteristics. Patients with DL lesions generally demonstrate difficulties in temporal and sensory integration, generating response alternatives, responding to feedback, and behavioral inhibition (Malloy & Duffy, 1994). Patients with OM lesions generally engage in

impulsive behavior and demonstrate impairments in personal and social decision-making, in the absence of intellectual decline (Eslinger & Damasio, 1985). It is understood that these complex behavioral changes are not directly resultant from frontal lobe lesions, but rather from the structural disconnection of the frontal lobes from other cortical and subcortical neural structures which regulate homeostasis in an individual (Damasio, 1996).

Recurrent episodes of out of control binge eating, followed by recurrent, impulsive attempts to rid of the calories consumed are central features of bulimia nervosa. Individuals with bulimia display a striking inability to inhibit these behaviors, despite the fact that they view their bingeing as pathological and dread their inability to control their eating. Even after months or years of intensive treatment, relapse rates are quite high among bulimic patients. Individuals with bulimia nervosa frequently have problems controlling their impulses in other areas besides eating. Approximately one third have co-occurring substance abuse or dependence (Vastag, 2001). Others may engage in stealing, go on excessive shopping sprees, or gamble (Maxmen & Ward, 1995; McElroy, Keck, Pope, & Smith, 1994). Many bulimics engage in self-destructive or self-mutilating behaviors; some are highly promiscuous (Maxman & Ward, 1995). Studies using the Minnesota Multiphasic Personality Inventory (MMPI) report personality profiles consistent with poor impulse control, chronic depression, acting-out behavior, and low frustration tolerance (Wonderlich, 1995). Borderline Personality Disorder and related impulse disturbance are often co-morbid diagnoses among bulimic women (Wonderlich, Swift, Slotnick, & Goodman, 1990).

In summary, impulsivity, inability to inhibit behavior, poor self-control, poor self-monitoring, poor planning, and failure to make shifts in behavior patterns are all hallmark features of bulimia nervosa. Given the role of frontal systems in these behaviors, one may speculate that frontal systems dysfunction could be implicated in the disease process of bulimia nervosa.

Neurobehavioral/Neuropsychological Studies

There has been a recent upsurge of interest in the examination of neuropsychological functioning in individuals diagnosed with and “at risk” for eating disorders. Considering speculative evidence of frontal systems involvement in disordered eating behavior patterns, the results of current neuropsychological studies are interesting. Several neuropsychological studies have specifically implicated patterns of dysfunction on tests sensitive to frontal lobe dysfunction. Various authors have demonstrated that individuals with bulimic symptoms exhibit marked impulsivity, problem solving deficits, and an inability to inhibit irrelevant information on neuropsychological tasks (Beatty, Wonderlich, Staton, & Ternes, 1990; Ferraro, Wonderlich, & Johnson, 1997; Ferraro, Wonderlich, & Joic, 1997; Pendleton-Jones, Duncan, Brouers, & Mirsky, 1991).

A study by Pendleton-Jones et al. (1991) seems most worthy of detailed review at this time. The Pendleton-Jones et al. (1991) study comprises the most methodologically sound neuropsychological investigation of eating disordered patients to date. Pendleton-Jones et al. (1991) included four groups of women in their study: 30 underweight anorexics; 38 normal weight bulimics; 20 long-term restored weight anorexics, and 39

normal control females. Groups were matched for age, education, and handedness, and all subjects were Caucasian. Any electrolyte abnormalities were restored to within normal limits prior to testing and subjects were excluded if they reported having a history positive for learning disability. The study included a comprehensive battery of tests, assessing nine psychological and neuropsychological domains, including: executive functioning (using the Trailmaking Test (TMT), Stroop, Talland Letter Cancellation Test-Revised, Wisconsin Card Sorting Test (WCST), and the Category Test); general intelligence (using the Weschler Adult Intelligence Test-Revised (WAIS-R); language (using Controlled Oral Word Association (COWA), Boston Diagnostic Aphasia Examination (BDAE) Narrative Writing, Token Test, Semantic Aphasia Test); memory (using the Weschler Memory Scale, Buschke Selective Reminding Test, Auditory Verbal Learning Test, Babcock Story Recall Test, Recurring Figures Test, Rey Complex Figure Test); motor functions (using the Purdue Pegboard Test, BDAE Apraxia Test); personality (using the MMPI); sensory and perceptual (using the Biopter Vision Test, Dvorine Pseudo-isochromatic Plates, Titmus Stereo Test, Harris Test of Hand Dominance, Eye Dominance Test); vigilance (using the Continuous Performance Test (CPT); and visuospatial functions (using the Butters Embedded Figures Test, Witkin Embedded Figures Test, Hooper Visual Organization Test, and Raven Standard Progressive Matrices).

In order to reduce the number of variables from the large neuropsychological battery, the authors used a principle components analysis to derive five neuropsychological components. These five neuropsychological components were in the

domains of vigilance, focusing/execution, verbal, memory/comprehension, and visuospatial skills. The authors chose the 15 variables with the highest loadings for the five components. Subject's scores were transformed to z scores and then were averaged to yield a domain score. Using a MANOVA to analyze the domain scores, significant between-group differences were found in four of the five neuropsychological domains.

Both underweight anorexics and normal weight bulimics performed more poorly on the focusing/execution factor relative to normal controls. Underweight anorexics also performed worse than all subjects in the verbal domain and worse than normal controls in both the memory and visuospatial domains. The vigilance factor yielded no group differences.

The results of the study suggest that normal weight bulimics showed specific impairment in the area of focusing/execution, while underweight anorexics showed more diffuse cognitive dysfunction, as evidenced by their impaired performance in four of the five neuropsychological domains. The authors reported that overall, the women in the study were above average in their level of cognitive functioning, and the absolute differences in scores between eating disorder groups and normal controls were for the most part small, suggesting subtle rather than frank cognitive difficulties. In general, the eating disorder groups' mean scores differed little from published norms.

However, the specific focusing/execution problems demonstrated by bulimic individuals are interesting, given the behavioral manifestations of the disorder. Focusing and execution of behavior fall under the catch-all term of "executive functions" as described in the neuropsychological literature. Executive functions involve cognitive

capacities such as attention-interference, inhibition, planning, and mental flexibility (often seen in such behaviors as self-monitoring and shifting behavioral set); (Lezak, 1995). Impulsivity, rigidity, compulsive behavior, and erratic carelessness are also associated with the concept of executive functioning (Lezak, 1995). In much of the literature concerning the executive functions, frontal systems involvement is implicated.

Other studies have also reported deficits consistent with poor executive functions in bulimic individuals. Beatty et al. (1990) found evidence of cognitive impulsivity and inefficient inhibition in patients diagnosed with bulimia nervosa. Thirty-two bulimic women were compared with fourteen women diagnosed with major depressive disorder and forty-two normal control females without a history of eating disorder or affective illness on a battery of psychological and neuropsychological tests. The subjects were administered the Beck Depression Inventory (BDI), the State Trait Anxiety Inventory (STAI), and a neuropsychological battery consisting of the Symbol Digit Modalities Test, the Fluency Test (using letters, categories, famous people, and designs), the Brown Peterson Short Term Memory Test, including a free recall trial of the Brown Peterson. Both depressed patients and bulimic patients endorsed a high number of symptoms on the BDI and the STAI. In addition, both patient groups were impaired in learning and recalling a list of unrelated words and generating the names of famous people, relative to the normal control group. However, only the bulimic patient group made significantly more rule violations than normal controls on a design fluency task. Rule violation on design fluency represents a neuropsychological index of poor impulse control and a

failure to inhibit irrelevant information, traits often associated with impairments in executive functioning.

A study by Ferraro, Wonderlich, and Jovic (1997) expanded on the notion of disinhibition and impulse dyscontrol in bulimic individuals. The authors of the study sought to analyze bulimia from an individual differences perspective adopted from Kellas, Simpson, and Ferraro (1988), who examined the impact of normal healthy aging on speeded task performance. Kellas et al. (1988) found that the healthy older adult group was comprised of two sub-groups; one group that displayed a high level of variability in speeded task performance and one group that performed consistently. Ferraro, et al. (1997a) speculated that bulimic individuals would display a similar pattern of performance variability on neuropsychological tests. Twenty-three subjects who met the DSM-III-R (APA, 1987) criteria for bulimia nervosa were compared with twenty-eight normal controls on four neuropsychological tests: the Symbol-Digit Modalities Test; the Free Recall test; the WCST; and Affect/Eckman Faces test.

Between group differences were observed on neuropsychological tasks that measured inhibition, impulsivity, and problem-solving deficits. Bulimic individuals differed from controls on the Symbol-Digit Modalities Test, in that the bulimics were actually faster in the total time to complete the test. However, this increase in reaction time was associated with more errors, suggesting that individuals with bulimia show marked impulsivity through a speed-accuracy trade-off. Group differences were also demonstrated on Trial 1 of the Free Recall test. On this trial, bulimic individuals had

fewer correct responses, possibly indicating that they had difficulty initiating a successful problem solving strategy.

Bulimic individuals also differed from normals in overall performance on the WCST and the Affect/Eckman faces tests; and as hypothesized, bulimics were more variable than controls on approximately 50% of the tests given (Symbol Digit and WCST). The authors suggest that the results of the study provide support for inefficient problem solving ability and marked impulsivity in the neuropsychological performance of bulimic individuals.

In another study conducted by Ferraro, Wonderlich, and Johnson (1997), the authors noted that throughout earlier research, one of the neuropsychological deficits that bulimic individuals exhibited seemed to involve an inability to inhibit irrelevant information. For example, bulimic individuals demonstrated difficulties maintaining and switching category sets on the WCST, and had marked difficulty with selective information processing using a Stroop paradigm (Cooper & Fairburn, 1992a). Ferraro, et al. (1997b) looked to further examine inhibitory processes in individuals with bulimic symptoms using a negative priming paradigm. Negative priming tasks have been used extensively to assess the ability to inhibit irrelevant information across various populations. Results of studies have shown that individuals susceptible to distracter interference show diminished negative priming effects. Ferraro, et al. (1997b) hypothesized that if deficits in inhibiting irrelevant information were characteristic of the disease process of bulimia, those at-risk for the development of bulimia would

demonstrate reduced levels of negative priming when compared to individuals not at-risk for eating disorder.

Twenty-five individuals were identified to be at-risk for an eating disorder by their performance on the Screening Instrument for Identifying Individuals at Risk for Developing Anorexia and Bulimia Nervosa (SCANS). "At-risk" was determined by a score of 42 or higher on the General Dissatisfaction component of the SCANS and a score of 22 or higher on the Perfectionism component. Performances of the at-risk subjects were compared with those of twenty-five normal controls on a simple reaction time task and a negative priming task.

The two groups did not differ on the simple reaction time task, thereby reducing the possibility that the results were related to speed of processing. However, between-group differences were found on the negative priming task. Control subjects demonstrated intact negative priming, in that their responses on the critical trials were slower than their responses on control trials, while at-risk participants did not reveal this effect. Results were interpreted to indicate that those at-risk for eating disorders demonstrate deficiencies in their ability to inhibit irrelevant information. The authors speculated that faulty inhibition may be related to the obsessionality, perfectionism, impulsivity, and restraint features salient to eating disordered populations.

It is important to note that in general, decrements in neuropsychological functions exhibited by eating disordered and "at risk" subjects in the aforementioned studies were subtle and the reported data by no means suggests profound neuropsychological impairment. However, across the literature, these inefficiencies are severe enough to

differ significantly from the neuropsychological performances of normal control populations. It is interesting that the specific neuropsychological differences between bulimic individuals and controls are found primarily on measures of executive functioning. Throughout the literature, individuals with bulimic symptoms demonstrate relative deficits in such areas as focusing/execution, impulsivity, and failure to inhibit irrelevant information. These specific neuropsychological deficits correspond to many of the hallmark behaviors (poor self-control, poor self-monitoring, and failure to make shifts in behavior patterns) that present with the disorder.

Similar patterns of inhibitory inefficiencies have been described in various other populations, including, healthy older adults (Duchek, Balota, Faust, & Ferraro, 1995), attention deficit disorder (Tannock, Schachar, Carr, Chajczyk, & Logan, 1989), adult depressives (Posner, 1986), schizophrenics (Cohen & Servan-Schreiber, 1992), Alzheimer's Disease patients (Balota & Duchek, 1991), and poor comprehenders (Gernsbacher & Faust, 1991). Such authors have used a theoretical framework, referred to as the structure building framework (Gernsbacher, 1990), to explain this phenomenon. According to the structure building framework, the cognitive mechanisms of suppression and enhancement are involved in the activation of cognitive information and can be used to explain inhibitory inefficiencies across these diverse populations. Specifically, the structure building framework theory purports that a breakdown in inhibitory efficiency could be resultant from either 1). the inability to activate relevant information for a particular cognitive task (defective enhancement), or 2). the inability to inhibit

information that is present, but irrelevant, to a particular cognitive task (defective suppression); (Duchek, et al., 1995; Gernsbacher & Faust, 1991).

Using a picture/word interference paradigm first developed by Gernsbacher and Faust (1991), it has been argued that the cognitive inefficiencies demonstrated by particular patient populations can be attributed primarily to defective suppression, or an inability to inhibit partially active, irrelevant representations (Duchek, et al, 1995). For example, in the Gernsbacher and Faust (1991) paradigm, participants are presented with a series of superimposed pictures and words, and instructed prior to each trial to either attend to the "picture" or the "word". After the offset of the picture/word context display, a second test stimulus is presented which contains either another picture, or another word. The participant's task is to determine as quickly and as accurately as possible whether the stimulus was related to the cued dimension of the earlier displayed picture/word. Inefficient inhibition (defective suppression) is measured as the extent to which the irrelevant stimulus in a previous trial slows the participant's decision. Specifically, faulty inhibition occurs if the irrelevant picture or word from the previous trial "interferes" with a fast and accurate response time.

Gernsbacher and Faust (1991) found that less skilled comprehenders demonstrated more difficulty inhibiting irrelevant information on both picture and word trials, in comparison to more skilled comprehenders. Duchek, et al. (1995) found that healthy older adults had more difficulty inhibiting irrelevant words, but did not have more difficulty inhibiting irrelevant pictures, in comparison to younger adults. Duchek et al. (1995) interpreted these findings to mean that age-related deficits in inhibition were

dependent upon the fluency of the processing route. From these studies, it was determined that such participant samples demonstrated an inefficiency in inhibitory control, and that this inefficiency was resultant from defective suppression (Duchek et al., 1995). The findings suggest that the target subjects were more distracted by irrelevant information (Duchek et al., 1995; Gernsbacher & Faust, 1991).

This notion of a breakdown in inhibitory control (impaired suppression) is interesting, and may provide clues into the neuropsychological functioning of women diagnosed with, and at risk for, eating disorders. As reported previously, various authors have demonstrated that women with bulimic symptoms exhibit marked impulsivity, problem solving deficits, and an inability to inhibit irrelevant information (Beatty et al., 1990; Ferraro et al., 1997a; Ferraro et al., 1997b; Pendleton-Jones, et al., 1991). Thus, the results of several studies provide support that women with bulimic symptoms are quite susceptible to the effects of cognitive interference. It may be hypothesized that women with bulimic symptoms are more distracted by extraneous information due to a deficit in inhibitory control. As explained by Duchek et al. (1995), reduced inhibitory control may allow more "nongoal path ideas" to enter working memory and remain activated. Perhaps this is the mechanism by which individuals with bulimic symptoms demonstrate more difficulty on specific cognitive tasks.

It is also of interest whether this same pattern of distraction may be used as a model to explain why women with bulimic symptoms are more susceptible to the negative impact of thin-depicting media stimuli. It has been reported that bulimic women express substantially greater acceptance and internalization of sociocultural mores of

thinness and attractiveness (Striegel-Moore et al., 1985), and that women with bulimic symptomatology are most vulnerable to the negative effects of “thin-ideal” media messages (Heinberg & Thompson, 1995). It could be hypothesized that a breakdown in inhibitory control may predispose women with bulimic symptoms to selectively attend to “nongoal path” thin-depicting media information, allowing the information to enter into working memory and remain activated. It may be possible that a breakdown in inhibitory control contributes to a pattern of susceptibility or vulnerability to media/sociocultural messages.

In support of the notion that women with bulimic symptoms may exhibit a breakdown in inhibitory processes, a number of recent studies have examined patterns of information processing in women diagnosed with and “at risk” for eating disorders using modified Stroop (1935) paradigms. These studies indicate that women diagnosed with and “at risk” for eating disorders selectively attend to, or fail to inhibit information specifically associated with eating, weight, and shape. The next section will provide a brief background of the Stroop paradigm, and will subsequently outline a series of modified Stroop (1935) experiments using eating, weight, and shape words as stimuli. This discussion will serve to further describe a particular pattern of cognitive interference demonstrated by those with eating disorder symptoms.

Stroop Studies. In 1935, J.R. Stroop first introduced the “Stroop interference effect” in his doctoral dissertation examining attention and interference in serial verbal reaction. His work was based on earlier findings by Cattell (1886) and Brown (1915). In Cattell’s (1886) doctoral dissertation, supervised by Wundt, it was found that longer

latencies emerged in the naming aloud of objects and colors, relative to reading aloud their corresponding words. For example, saying the word "blue" to a patch of color took longer than reading the word "blue" in printed ink. Brown (1915) found that naming color patches took at least twice the time as reading the corresponding word, even with extended practice.

Stroop's (1935) original investigation extended the work of Cattell (1886) and Brown (1915) through the addition of a series of color and word tasks. Stroop (1935) found that individuals could read color names printed in incongruent colored ink as quickly as they could read the color name printed in black ink. For example, there was no reliable increase in time for reading the word "BLUE" written in green ink, when compared to the time for reading the word "BLUE" written in black ink. However, through a second series of experiments, Stroop (1935) found that naming an incongruent color of ink that a color word was printed in required twice the average response time of naming the color of a solid ink patch. For example, if the color "BLUE" was written in green ink, it took individuals twice as long to name the incongruent color of ink, "GREEN", than to name the color of a solid square patch. Stroop (1935) found that practice could reduce this effect, but the effect could spontaneously return and be maintained over time.

This effect became known as the "Stroop interference effect". Since that time, the Stroop effect has proven to be robust (MacLeod, 1991). In general, the Stroop paradigm has endured many variations, numerous stimulus manipulations, and many theoretical interpretations, all of which are beyond the scope of this paper (for a review see

MacLeod, 1991). Several explanations for the "Stroop interference effect" have been proposed (Dyer, 1973). Some attribute the slowing to response-conflict, suggesting there is a faster assignment of spoken words to written word stimuli, relative to the assignment of spoken words to visual color stimuli. Stroop (1935) used this interpretation of his results, stating that there are a variety of learned responses to any specific color, but only one learned response to a written word. Stroop (1935) proposed the response latency effect results from the conflict between the variety of response choices in the naming of color stimuli.

Others attribute the effect to response-competition, meaning that there is competition between irrelevant and relevant information (Dyer, 1973). This theory of the Stroop interference effect suggests that irrelevant information (written color word) is readily attended to and occupies a position in the serial response buffer. This prevents relevant information (color naming response) from occupying the buffer immediately. Others describe the Stroop interference effect as resultant from a failure to inhibit the irrelevant information (response-inhibition) or a failure to selectively attend to relevant information (Dyer, 1973). MacLeod (1991) proposed that theories highlighting the parallel processing of the relevant and irrelevant dimensions offer the most promise for explaining the complex Stroop effect. Of the existing theories, none have been able to fully capture the complex phenomenon involved in the processes of attention and interference involved in the robust Stroop effect.

The Stroop, in its original form, consists of three sets of stimuli (Trenerry, Crosson, DeBoe, & Leber, 1988). The first set of stimuli is a series of color names

printed in black ink, which the subject is asked to read aloud. The second set of stimuli is a series of colored ink patches, in which the subject is asked to identify aloud the color of each patch. The third set of stimuli consists of a series of color names printed in incongruent colored ink, and subjects are asked to name the color of the ink, rather than read the color word. The third set of stimuli produces the Stroop interference effect, because the printed color word interferes with the verbal report of the incongruent printed ink color (Trener et al., 1988). The interference effect is generally measured as the latency difference between the control condition (reading words in black ink) minus the experimental condition (naming incongruent colored ink).

The Stroop task has been used in several capacities. It is often used as a neuropsychological task to measure specific higher cortical functioning, and to differentiate between brain-damaged and normally functioning individuals (Lezak, 1995). The Stroop phenomenon also continues to offer rich potential in the study of individual differences. In a landmark study by Klein (1964), it was first illustrated that interference of color naming appeared for words other than incongruent color names. By systematically manipulating word meaning and word category in a color-word paradigm, Klein (1964) demonstrated that the semantic aspects of a word influenced color-naming speed. The results of his study showed that original color words (those that were the color of the ink used in the study) produced the most interference, followed by other color words, then color-related words (i.e. fire, grass), then unassociated words, then rare words (abjure), and finally nonsense syllables. Klein's (1964) results suggested that the more meaningful the irrelevant word, the more interference it caused. Since then, several

studies have demonstrated that as the target word's semantic association increases, so does its potential for interference (MacLeod, 1991).

Recently, modified Stroop paradigms have been used to examine representational cognitive structures in certain clinical populations. For example, recent extensions of the Stroop have been applied to psychological domains such as affect (Gardner, 1985), depression (Gotlib & Cane, 1987; Gotlib & McCann, 1984), post-traumatic stress disorder (PTSD); (Foa, Feske, Murdock, Kozak, & McCarthy, 1991), panic disorder (Ehlers, Margraf, Davies, & Roth, 1988; McNally, Riemann, & Kim, 1990), arachnophobia (Watts, McKenna, Sharrock, & Trezise, 1986), social phobia (Hope, Rapee, Heimberg, & Dombeck, 1992), obsessive compulsive disorder (McCarthy, Foa, Murdock, & Hia, 1990) and other anxiety states (Mathews & Macleod, 1985; Mogg, Mathews, & Weinman, 1989). Channon, Hemsley and de Silva (1988) and Ben-Tovim, Walker, Fok, and Yap (1989) triggered a series of investigations by various authors extending the Stroop paradigm to individuals with eating disorder symptomatology.

In the modified Stroop paradigm, words of particular salience to the target population (i.e. negative affect words, such as "sad" or "lonely" in a depressed population; threat-laden words, such as "assault" or "penetrate" in a PTSD rape population; and eating, weight, and shape words, such as "fat" or "thighs" in an eating disordered population) are presented in different colored ink. The subject is asked to name the color of the ink in which the salient word is printed. Subjects are asked to repeat this procedure using neutrally rated words as stimuli. Researchers have found that in comparison to control populations, target populations produce significantly

exaggerated color naming interference in response to words salient to their particular pathology. This interference effect indicates that individuals selectively attend to (or have more difficulty inhibiting) irrelevant stimuli, if that stimuli has strong semantic associations with concerns relevant to their particular disorder.

Profound preoccupation with weight and shape are salient to the disease processes of anorexia nervosa and bulimia nervosa. Many eating disordered patients are also preoccupied with thoughts of food or eating, albeit the preoccupation may surround either avoiding food consumption or planning a binge. Eating, weight, and shape have been identified as the three areas pertinent to eating disorder pathology (Fairburn, Cooper, Cooper, McKenna, & Anastasiades, 1991). Results of a number of recent investigations have shown that eating disordered populations selectively attend to, or fail to inhibit, information that pertains to eating, weight, and shape on modified Stroop tasks, meaning that the presentation of such information results in exaggerated interference of color-naming.

Although many well-controlled studies have consistently shown that a link exists between eating disordered symptomatology and a failure to inhibit words with particular salience to this population, inconsistencies have emerged in the literature. It is speculated that the differences that exist between studies are secondary to methodological differences in task development, variability among sample populations, selection of diverse dependent variables, and the use of different statistical analyses. Regardless, definitive themes have emerged throughout this body of literature, suggesting that the failure to inhibit eating, weight, and/or shape words is present in patients diagnosed with

anorexia nervosa (Ben-Tovim & Walker, 1991; Ben-Tovim, et al., 1989; Channon et al., 1988; Cooper & Todd, 1997; Green, McKenna, & de Silva, 1994; Jones-Cesters, Monsell, & Cooper, 1998; Long, Hinton, & Gillespie, 1994; Perpina, Hemsley, Treasure, & de Silva, 1993; Sackville, Schotte, Touyz, Griffiths, & Beumont, 1998), patients diagnosed with bulimia nervosa (Ben-Tovim & Walker, 1991; Ben-Tovim et al, 1989; Cooper, Anastasiades, & Fairburn, 1992; Cooper & Fairburn, 1993; Cooper & Todd, 1997; Fairburn et al., 1991; Lovell, Williams, & Hill, 1997; Perpina et al., 1993), recovered anorexics (Lovell et al., 1997), short-term and long-term recovered bulimics (Flynn & McNally, 1999), and various "at-risk" groups with characteristic eating disorder features (Cooper & Fairburn, 1992a; Formea & Burns, 1996; Green & Rogers, 1993; Houn & Brown, 1996; Perpina, et al., 1993).

Dobson and Dozois (1999) conducted a meta-analytic review of the literature related to the information processing in participants with bulimia, anorexia nervosa, and dieting/restrained eating on modified Stroop paradigms. The authors found that bulimic participants were reliably differentiated from normal controls in studies that employ food and body-related stimuli, whereas anorexic participants were not consistently different from controls. In addition, they found that performances of dieting/restrained eaters on modified Stroop stimuli did not typically differ from normal populations.

Cooper and Fairburn (1993) found that the interference with color naming eating, weight, and shape words was more closely related to features specific to bulimia nervosa, rather than measures of general psychopathology. Using a population of seventy-five patients with bulimia nervosa, they found that frequency of purging was the best

predictor of interference. Results from Formea and Burns (1996) support this finding, in that higher scores on the Bulimia Test-Revised were significantly correlated with the latency and error difference scores on the modified Stroop paradigms. These findings suggest that the Stroop interference effect found with eating, weight, and shape words is correlated with bulimic symptom severity.

The modified Stroop paradigms used in eating disorder populations have been of particular clinical interest for two reasons. First, there is speculation that modified Stroop tasks may provide a means to measure eating disorder psychopathology. Group differences in color naming on modified Stroop tasks, in the absence of group differences on the original Stroop task, generate the possibility of using the modified Stroop as an index to denote the intensity of eating disorder symptoms. Eating disordered patients often deliberately deny or lack insight into the severity of their illness. Therefore, Ben-Tovim et al. (1989) suggested that using the modified Stroop as a measure of psychopathology held the potential of reducing self-report distortions common in eating disordered patients. However, since some studies have found that dieters and subjects in certain "at risk" groups are also slower to color name food and shape words relative to neutral words, this cautions against the use of the modified Stroop as a diagnostic tool. Further research is needed to examine the usefulness of modified Stroop paradigms in distinguishing between normative dieting and weight concerns and the identification of women "at risk" for developing eating disorders.

Second, there is evidence that the Stroop effect is reduced upon treatment implementation. For example, the spider phobics in the Watts et al. (1986) study

demonstrated a reduction in color naming latency of spider related threat words after treatment with exposure therapy. Studies using eating, weight, and shape words as Stroop stimuli have also demonstrated a reduction in color naming latency by bulimic women after the implementation of a trial of cognitive behavioral therapy (Carter, Bulik, McIntosh, & Joyce, 2000; Cooper & Fairburn, 1994). Although the potential clinical implications of these findings are interesting, it is still undetermined at this time whether the Stroop effect is generally reduced over time, regardless of the implementation of an intervention (MacLeod, 1991). Some studies have found that practice reduces the Stroop effect, while others conclude that practice is not a particularly important variable, since the Stroop effect can be maintained over time (MacLeod, 1991). Walker, Ben-Tovim, Jones, and Bachok (1992) found that alternate versions of the modified Stroop task using food and body shape words obtained reliable results over a two week test-retest period. This finding suggests that learning effects may not influence the magnitude of interference in color-naming food and body shape words, and offers some evidence for the utility of modified Stroop paradigms as treatment outcome measures. Although the evaluation of practice effects using Stroop paradigms warrants further investigation, continued application of the Stroop task to clinical settings, specifically in the evaluation of treatment outcome, may be a promising area for future research.

One criticism in this body of literature concerns the external validity of using the Stroop task in relation to psychopathology (Dobson & Dozois, 1999). Real world stimuli may not be processed merely in terms of semantic attributes, but also in conjunction with a host of other characteristics that may be equally salient. As described by Gernsbacher

and Faust (1991), understanding the environment involves the ability to attend to and understand stimuli that originate from a variety of modalities. Various authors have questioned the exclusive use of verbal assessment instruments to evaluate cognitive factors in psychopathology.

In response to this criticism, Walker, Ben-Tovim, Paddick, and McNamara, (1995) conducted an interesting study using a pictorial adaptation of the Stroop, designed to measure body-related concerns of eating disordered individuals. The authors compared the performances of 20 eating disordered patients to 20 female undergraduate control subjects on two categories of colored line-drawn stimuli material. The first category of stimuli contained 10 rows of 10 balls (two each of five types per line: golfball, baseball, basketball, oval football, round soccerball). The second category of stimuli contained 10 rows of 10 female figures (ranging from emaciated to extremely obese). The subjects were instructed to say the color of the line-drawn pictures, row by row, as fast as they could. The administration of the task was analogous to that of the modified verbal Stroops.

Both groups were significantly slower on color-naming the figures relative to the balls, and eating disordered patients were significantly slower on both tasks relative to controls. Further analyses revealed interference scores (time for color naming balls subtracted from time for color naming figures) were significantly larger for patients, relative to controls. These findings suggest that eating disorder patients selectively attend to, or fail to inhibit pictorial representations of salient "body type" stimuli in the same

manner as was found with verbal representations of eating, weight, and shape information.

The results of the Walker et al. (1995) study, along with the results of other studies using modified Stroop paradigms provide a preponderance of evidence suggesting that women with eating disordered symptoms are susceptible to cognitive interference from stimuli associated with eating, weight, and shape concerns, across both linguistic and nonlinguistic modalities. These findings provide corroborating evidence of a possible breakdown in inhibitory control evidenced by women with bulimic symptoms.

The Walker et al. (1995) study offers potential in response to the criticism posed by Dobson and Dubois (1999) regarding concern over the exclusive use of verbal assessment instruments to evaluate cognitive factors in eating disorders. An extension of the paradigm developed by Walker et al. (1995) may be useful to determine if a similar Stroop effect can be obtained with other symbolic representations of the concerns salient to eating disordered patients. Considering the breadth of literature suggesting that women susceptible to the development of eating disorders are more vulnerable to negative influence from media messages pictorially representing the "thin ideal", one such extension would be to examine the Stroop effect using print media advertisements of thin women. Although it is highly interesting that women susceptible to, and diagnosed with eating disorders selectively attend to eating, weight, and shape words and simple line drawings of female figures, the ecological validity of these findings is questionable. It is rare for American women to come across repetitive representations of words related to eating, weight, and shape or line drawings of female figures in their

daily lives. However, the average American woman is exposed to as many as 3,000 advertisements per day, many of them depicting representations of the “thin ideal” woman (Kilbourne, 2000).

The use of a Stroop paradigm using “thin ideal” media representations as stimuli may provide a more ecologically valid way to further characterize a pattern of cognitive interference in women with bulimic symptoms, and would offer a unique addition to the existing Stroop literature. Such a Stroop paradigm may also offer clues to explain why women with bulimic symptoms are more susceptible to the negative impact of thin-depicting media stimuli, by providing a way to experimentally manipulate inhibition of such stimuli.

The Present Study

The goal of the present study was to further explore the role of inhibitory dyscontrol in a sample of women with bulimic symptomatology. Several lines of evidence give rise to the notion of a possible breakdown in inhibitory control (impaired suppression) in women with bulimic symptoms.

First, the literature supports the idea that there is something unique among women who engage in binge eating and purging/nonpurging compensatory behaviors that differentiates them from women with normative dieting and weight concerns and women with restricting anorexia (Gleaves, Lowe, Green, et al., 2000; Gleaves, Lowe, Snow, et al., 2000). In addition, throughout the literature, individuals with bulimic symptoms have been described as having a striking inability to inhibit various behaviors, both central to and irrelevant from the disorder of bulimia. These behaviors include bingeing and purging

and other impulse control problems, such as substance abuse (Lowe & Eldredge, 1993; Vastag, 2001), sexual promiscuity (DaCosta & Halmi, 1992; Gleaves, Lowe, Green, et al., 2000), self-harm and self-mutilation (Vandereycken & Pierloot, 1983), excessive spending, stealing, and shoplifting, (Vandereycken & Pierloot, 1983), and gambling (Maxmen & Ward, 1995). Binge eating and purging/nonpurging compensatory behaviors are also associated with other psychopathological characteristics, including: impulse disturbance chronic depression, acting-out behavior, low frustration tolerance, Borderline Personality Disorder and other cluster B personality disorders (Wonderlich, 1995; Wonderlich, et al., 1990). Bulimic attitudes and behaviors among nonclinical groups have also been highly correlated with impulsive behaviors (Penas Lledo & Waller, 2000), and highly impulsive bulimics display disappointing response of bulimic symptoms to treatment (Keel & Mitchell, 1997).

Second, neurobehavioral studies of eating disorders suggest that women “at risk” for, or diagnosed with bulimia nervosa demonstrate impulsivity, inefficient problem solving ability, and an inability to inhibit irrelevant information on neuropsychological tasks (Beatty, et al., 1990; Ferraro et al., 1997a; Ferraro et al., 1997b; Pendleton-Jones, et al., 1991). Studies using modified Stroop paradigms also provide evidence suggesting that women with bulimic symptoms are susceptible to cognitive interference from stimuli associated with eating, weight, and shape concerns, across both linguistic and nonlinguistic modalities (Ben-Tovim & Walker, 1991; Ben-Tovim et al., 1989; Cooper et al., 1992; Cooper & Fairburn, 1993; Cooper & Todd, 1997; Dobson & Dozois, 1999; Fairburn et al., 1991; Lovell, et al., 1997; Perpina, et al., 1993; Walker et al., 1995).

Thus, the results of several studies provide support for the notion that women with bulimic symptoms are susceptible to the effects of impulse dyscontrol and inefficient inhibition.

Third, the sociocultural model of eating disorders purports the mass media plays a role in the development of eating disorders, by placing a high societal value on thinness and attractiveness (Striegel-Moore, Silberstein, & Rodin, 1986). Studies have demonstrated bulimic women express substantially greater acceptance and internalization of sociocultural mores about thinness and attractiveness (Striegel-Moore, et al., 1985), and endorse more perceived pressure to be thin stemming from media sources (Irving, 1990). It appears that these same women (those who engage in binge eating and purging/nonpurging compensatory behaviors) are particularly vulnerable to negative influence from laboratory exposure to stimuli representing "thin ideal" stereotypes (Hamilton & Waller, 1993; Heinberg & Thompson, 1995; Waller et al., 1993). However, there has been no attempt in the literature to understand why women with bulimic symptoms are more negatively affected by thin depicting media. There has also been no attempt to link the aforementioned findings, or to describe these phenomena within a common theoretical cognitive framework.

Of interest, is whether there is a common link between the characterological and neurobehavioral features of women with bulimic symptoms and their susceptibility to negative influence from mass media representations of thin-ideal stereotypes. A possible connection may be made through the application of the structure building framework described by Gernsbacher (1990). Within this framework, the notion of a breakdown in

inhibitory control (impaired suppression) has been used to explain deficient inhibitory processes across a number of diverse subject groups (Gernsbacher & Faust, 1991; Duchek et al., 1995). This model may provide a way to explain the neuropsychological functioning of women diagnosed with and at risk for eating disorders, and may provide a way to explain why women with bulimic symptoms are more susceptible to the negative effects of thin-depicting media.

The main purpose of the study was to determine if women with bulimic symptomatology (as indicated by moderate to high scores on the Bulimia Test-Revised) would exhibit less efficient inhibition when presented with irrelevant print “thin-ideal” media stimuli, relative to a control group of women. Specifically, it was predicted that women with bulimic symptoms would have more difficulty suppressing irrelevant media images of thin models than they would suppressing irrelevant media images of neutral stimuli. However, it was predicted that women with minimal or no bulimic symptoms would not differ across the two conditions.

A novel Stroop paradigm, using print advertisements of “thin-ideal” female models as stimuli, was designed for this purpose. The following chapters will further discuss the design and implementation of this modified Stroop paradigm as a measure used to characterize the inhibitory processing of women with bulimic symptoms.

It was hypothesized that if women with bulimic symptomatology were less efficient in their ability to inhibit this particular information, then they should reveal longer latencies in response to “thin ideal” stimuli (experimental stimuli), relative to “neutral” stimuli (control stimuli). A difference in response latencies between

experimental and control two stimuli would be referred to as a “Stroop interference effect”. The presence of a Stroop interference effect in response to thin-depicting media information may provide further converging evidence suggesting that women with bulimic symptoms demonstrate inefficient inhibitory control (less efficient suppression), and that this inefficient inhibitory control may contribute to their susceptibility or vulnerability to media/sociocultural messages. Specific hypotheses of the present study are listed below.

Hypotheses

1. It was hypothesized that a modified Stroop paradigm using print advertisements of thin women would produce an interference effect comparable to that of modified verbal Stroop paradigms, while providing a more ecologically valid measure of concerns pertinent to individuals “at risk” for or diagnosed with eating disorders. It was hypothesized that the interference score (latency of experimental stimuli – latency of control stimuli) of the modified pictorial Stroop would positively and significantly correlate with other modified Stroop paradigms measuring eating, weight, and shape concerns, and that the modified pictorial Stroop paradigm would produce an overall “Stroop interference effect”. An overall “Stroop interference effect” would be measured as the latency difference between the card sorting time of “experimental stimuli” and card sorting time of “control stimuli”, which is typically how this construct is measured.
2. It was hypothesized that women with moderate to high bulimic symptoms (Group 2) would exhibit less efficient inhibition when presented with print “thin ideal”

media stimuli. Deficient inhibition would be demonstrated by the existence of a “Stroop interference effect” on the modified pictorial Stroop, with interference measured as the latency difference between the card sorting time of salient thin ideal female model stimuli and the card sorting time of neutral home furnishing stimuli. Specifically, it was hypothesized that Group 2 women would differ significantly between the two stimuli conditions, in that they would be slower to sort cards with thin-depicting media pictures as background stimuli than they would be to sort cards with neutrally-rated home furnishing pictures as background stimuli. It was hypothesized that Group 1 women would not differ between the two stimuli conditions.

3. It was also hypothesized that the results of Cooper and Todd (1997), showing that anorexic and bulimic patients demonstrate selective processing of eating, shape, and weight information relative to normal control subjects, would be replicated in a sample of women “at risk” for bulimia nervosa.
4. It was hypothesized that women reporting higher levels of bulimic symptoms would show trends towards poorer performances on measures of executive functioning, since executive function is often linked to performance decrements in the ability to inhibit. Prior studies have demonstrated inefficiencies in executive functions in women diagnosed with and at-risk for bulimia (Beatty et al., 1990; Ferraro et al., 1997a; Ferraro et al., 1997b; Pendleton-Jones et al., 1991).
5. In addition, on the basis of other neuropsychological findings demonstrating visuo-spatial deficits in eating disordered patients (Bowers, 1994; Thompson,

1993; Fox, 1981), it was hypothesized that women reporting higher levels of eating restraint would show more difficulty on visuo-spatial tasks.

CHAPTER II

CREATING AND TESTING THE MODIFIED PICTORIAL STROOP PARADIGM

Pilot Study #1

Introduction

An initial pilot study was conducted to select stimuli for the creation of a modified Stroop paradigm using print media advertisements of “thin-ideal” female models as stimuli. The primary goal of developing this task was to provide a means to test if women with bulimic symptoms are less efficient in suppressing irrelevant information across modalities, particularly if that irrelevant information pertains to eating disorder concerns. Specifically, it was of interest to examine if women with bulimic symptoms demonstrate an inability to inhibit irrelevant media images of thin models, relative to a control group of women reporting minimal or no bulimic symptoms. The present task was designed with this goal in mind.

It has already been established that women with bulimic symptoms selectively attend to, or fail to inhibit eating, weight, and shape words and line drawings of female body types (Ben-Tovim & Walker, 1991; Ben-Tovim et al., 1989; Cooper et al., 1992; Cooper & Fairburn, 1993; Cooper & Todd, 1997; Fairburn et al., 1991; Lovell et al., 1997; Perpina et al., 1993; Walker et al., 1995). It has also been shown that women with bulimic symptoms are more negatively affected by thin-depicting media, relative to women without bulimia symptoms (Hamilton & Waller, 1993; Heinberg & Thompson,

1995; Waller et al., 1992). However, there has been no attempt in the literature to understand why women with bulimic symptoms are more negatively affected by thin-depicting media, or to place this phenomenon within a theoretical cognitive framework. One possible explanation could use the structure building framework described by Gernsbacher (1990). Using this framework, it may be possible that women with bulimic symptoms show defective suppression, in that they are inefficient in their ability to inhibit information that is present, but irrelevant to the situation. It could be hypothesized that a breakdown in inhibitory control may predispose women with bulimic symptoms to selectively attend to “nongoal path” thin-depicting media information, allowing frequent and prolonged activation of working memory in response to this information. Using this as an explanatory model, it could be hypothesized that a breakdown in inhibitory control contributes to a pattern of susceptibility or vulnerability to media/sociocultural messages in this group of individuals.

To examine this, it was important to somehow design a task that could experimentally manipulate levels of interference secondary to the exposure to thin-depicting media sources and compare this with levels of interference secondary to the exposure to neutral media sources. It was hypothesized that if women with bulimic symptomatology did have difficulties inhibiting thin-depicting media information, then they should reveal longer latencies in response to “thin ideal” stimuli, relative to “neutral” stimuli. The design of the task used by Gernsbacher and Faust (1991) used words superimposed over pictures to examine the efficiency of suppression (ability to inhibit) across modalities in less skilled comprehenders. It was determined that this

model could be followed in order to examine the efficiency of suppression (ability to inhibit thin-depicting media information) in a sample of women with bulimic symptoms. Therefore, the stimuli used for the present experimental design was also designed to superimpose words over pictures, albeit the pictures were media advertisements of thin-ideal female models and neutrally-rated media pictures. It was also determined that the failure to inhibit a specific type of “irrelevant” information (i.e. thin-depicting media information) would be best measured by the extent to which that “irrelevant” information interfered with “relevant” information of a goal directed task. The goal directed task chosen for this paradigm was the card sorting Stroop task modeled after the design used by Taylor and Clive (1983). By using a card sorting version of the Stroop task, visual stimuli could easily be incorporated into the design.

Although this task may not be perfectly analogous to the standard Stroop task, Taylor and Clive (1983) found that interference scores on the conventional chart form of the Stroop were positively and significantly correlated with the interference scores the card sorting Stroop. In addition, Dyer (1973) reported that, in general, the variations and modifications of the Stroop task throughout different studies have only modestly affected its ability to produce an interference effect

Pilot Study #1 was conducted to select specific stimuli for the modified pictorial Stroop paradigm; Pilot Study #2 was conducted to determine this particular task’s relationship to other modified Stroop paradigms, and its ability to produce a “Stroop interference effect”.

Methods

Materials

For the creation of a Stroop task, two sets of stimuli are required - experimental stimuli and neutral stimuli. Based on previous studies (Hamilton & Waller, 1993; Waller et al., 1992), it was determined that experimental stimuli would consist of pictorial representations of “thin-ideal” female body types taken from fashion and beauty magazines; and control stimuli would consist of pictorial representations of home furnishings taken from magazines dedicated to home renovation and decoration. While it could be argued that pictorial representations of normal or large women would serve as more stringent control stimuli, such images are difficult to identify in existing popular magazines. Hamilton and Waller (1993) chose pictures of home furnishings as control stimuli in their examination of the effects of thin-depicting media on women with eating disorders. Because of the high representation of pictures of home furnishings in popular print media, Hamilton and Waller (1993) speculated that pictures of home furnishings would best serve as genuine media comparison photographs. This rationale was followed for the selection of stimuli in the present study. Usage of pictures of home furnishings as control stimuli was thought to further ensure adequate ecological validity for the modified Stroop task. The following procedures were followed for the selection of stimuli and the creation of the modified pictorial Stroop paradigm.

Five undergraduate research assistants (1 male, 4 female) volunteered to randomly select pictorial stimuli from popular magazines. For the “experimental” condition, 100 advertisements of female models were selected from the following

women's fashion and beauty magazines: July 1999 issue of *Cosmopolitan* (5 pictures); August 1999 issue of *Glamour* (13 pictures); September 1999 issue of *Harper's Bazaar* (21 pictures); September 1999 issue of *Vogue* (29 pictures); and October 1999 issues of *Cosmopolitan* (8 pictures); *Maxim* (3 pictures); *Vogue* (5 pictures); *Glamour* (4 pictures); *Jane* (1 picture); *Victoria's Secret* (10 pictures); and *Vanity Fair* (1 picture). All selected pictorial advertisements were of standard 8 ½" x 11" size, and portrayed individual women showing at least ¾ of the female model's body (including the head down to at least lower thigh). No overlaid type was present on the page. These photographs were similar to those used in previous studies examining the effects of thin-depicting media (Hamilton & Waller, 1993; Irving, 1990; Stice & Shaw, 1994; Waller et al., 1992), and are likely representative of those typically found in the women's fashion and beauty magazines.

For the "control" condition, 100 photographs were selected from popular magazines dedicated to home renovation and decoration. The following magazines were used: Fall 1999 issue of *Better Homes and Gardens Special Issue Publication, Beautiful Baths* (24 pictures); October 1999 issue of *Home Magazine* (12 pictures); Fall 1999 issue of *Better Homes and Gardens Special Interest Publication, Decorating* (17 pictures); October 1999 issue of *House Beautiful* (7 pictures); Fall 1999 issue of *Pottery Barn* (29 pictures); and October 1999 issue of *Elle Décor* (11 pictures). The control images were of standard 8 ½" x 11" size, and portrayed innocuous full-page pictures displaying individual rooms in a home. These pictures were free of people and did not contain any overlaid text.

Participants

A pilot study was conducted to obtain ratings on the salience and neutrality of the pictorial stimuli in order to select pictures for use in the modified Stroop paradigm. Thirty-seven (26 female, 11 male) undergraduate and graduate students enrolled in a university psychology course were offered research credit to participate in this pilot study. Participants ranged from 20 to 50 years of age ($M=24.86$, $SD=7.30$). The mean education of the participants was 16.51 years ($SD=2.64$). Subjects were informed that they were participating in a study designed to gather data examining student's perceptions of certain print media advertisements, and that their opinions would be used to select media stimuli for a dissertation project. Prior to participation, all subjects signed a written informed consent. See Appendix A.

Procedures

The pilot study was conducted in a group format/classroom setting. The 200 (100 female model, 100 home furnishing) pre-selected pictures were projected onto a video screen and presented one at a time, for approximately twenty-seconds each. For the first 100 female model advertisements, participants were asked to make three opinion ratings on a 10 point Likert scale: 1) rate the model's body type (in your opinion), with 0 being "not thin at all" and 10 being "very thin"; 2) rate the model's attractiveness level (in your opinion), with 0 being "not attractive at all" and 10 being "very attractive"; and 3) rate how much this picture influences you to think about eating, weight, or body shape (in your opinion), with 0 being "no influence at all" and 10 being "strong influence". The rationale for including rating #3 was based on prior literature identifying eating, weight,

and shape concerns as the three areas pertinent to eating disorder pathology (Fairburn et al., 1991). Words relevant to these three concerns have been used as stimuli in modified verbal Stroop paradigms (Cooper & Todd, 1997).

For the second 100 advertisements, participants were asked to make two opinion ratings on a 10 point Likert scale: 1) rate how interesting you find this ad (in your opinion), with 0 being “not interesting at all” and 10 being “very interesting”; 2) rate how much this picture influences you to think about eating, weight, or body shape (in your opinion), with 0 being “no influence at all” and 10 being “strong influence”. Participants were provided with an instruction sheet and forms to record their ratings. See Appendix B.

Results

Ratings 1, 2, and 3 for the 100 female model pictures were summed across the 37 participants, and three mean rating scores were derived for each picture. Pictures with the highest summed ratings across all three dimensions were considered to be most “salient” to eating, weight, and shape concerns, and selected to be included in the final stimuli used in the project. Fifty-four female model pictures were selected for final inclusion. All 54 female model pictures had mean ratings above 8 on rating #1 (thin body type). Mean ratings of the 54 selected female model stimuli ranged from 6.11 to 8.30 on rating #2 (level of attractiveness), and mean ratings ranged from 2.57 to 4.05 on rating #3 (influence of thinking about eating, weight, or body shape).

Ratings 1 and 2 for the 100 home furnishing pictures were also summed across the 37 participants, and two mean rating scores were derived for each picture. Pictures

with the lowest summed ratings across the two dimensions were considered to be most “neutral” in terms of eating, weight, and shape concerns and selected to be included in the final stimuli used in the project. Fifty-four home furnishing pictures were selected for final inclusion. Mean ratings of the 54 home furnishing selected stimuli ranged from 2.62 to 4.59 on rating #1 (how interesting is the picture). All 54 home furnishing pictures had a mean rating less than 1 (range=.11 to .32) on rating #2 (influence of thinking about eating, weight, or body shape). A significant difference was found between rating #3 (influence of thinking about eating, weight, or body shape) for the 54 selected female model stimuli and rating #2 (influence of thinking about eating, weight, or body shape) for the 54 selected home furnishing stimuli ($t[33]=7.37, p<.0001$). From this significant difference, it was determined that the home furnishing stimuli would adequately serve as control or “neutral” stimuli for the purposes of this experiment.

Creating the Stimuli

The 54 female model pictures determined to be most salient in terms of subjective ratings of thinness, attractiveness, and influence over thinking about eating, weight, and shape were selected for final inclusion in the modified Stroop paradigm. These 54 female model pictures serve as the “experimental” stimuli. The 54 neutral home pictures determined to be least salient in terms of subjective ratings of interest and influence over thinking about eating, weight, and shape were selected for final inclusion in the modified Stroop paradigm. These 54 home furnishing pictures serve as the “control” stimuli. A Hewlett Packard OfficeJet R Series scanner was used to scan each of the 108 selected pictures into Adobe Photoshop software. Photographs were scanned in black and white

to eliminate confounding background color effects with colored “Stroop” words. Each black and white photograph was then imported into Microsoft Power Point where a printed color word (RED, BLUE, or GREEN) was written in one-inch block capital letters and randomly superimposed in the center of the photograph at either the top, middle, or bottom portion of the page. Color and placement of the printed color words were counterbalanced for both the experimental and control stimuli. For example, six of the experimental stimuli had the word RED written in the color red superimposed over the picture, six of the experimental stimuli had the word RED written in the color blue superimposed over the picture, and six of the experimental stimuli had the word RED written in the color green superimposed over the picture. Two of each color combination were present at either the top, middle, or bottom center of the page. This counterbalancing procedure was repeated for each of the nine color combinations, across both experimental and control stimuli.

Photographs were printed out on individual sheets of standard 8 ½” x 11” paper and laminated. See Appendices C and D for examples of experimental and control stimuli. One set of non-pictorial control stimuli was also created. This contained 54 individual 8 ½” x 11” laminated sheets of paper with a printed color word (RED, BLUE, or GREEN) written in incongruous ink (i.e., RED written in blue ink, GREEN written in red ink, BLUE written in green ink, etc.) centered on the page. The color and placement of the printed color words were counterbalanced following the procedures listed above

Stimuli were also created for the manipulation check, which was conducted upon the completion of the modified Stroop paradigm task. Twenty of the 54 selected female

model pictures and twenty of the 54 selected neutral home pictures were randomly chosen as stimuli for the manipulation check. These forty pictures were each printed out in black and white on standard 8 ½" x 11" paper without the color word printed on the page. Foil stimuli were randomly selected from the unused female model pictures and unused home furnishing pictures that were not selected for inclusion during the pilot rating study. Forty pictures were selected (20 female model, and 20 home furnishing), scanned into Adobe Photoshop software, and printed in black and white on standard 8 ½" x 11" paper. Stimuli for the manipulation check were also laminated.

Pilot Study #2

Introduction

A second pilot study was conducted prior to the implementation of the experiment proper, in order to test the applicability of the modified pictorial Stroop paradigm, using pictorial media images. It was hypothesized that: 1) the modified pictorial Stroop paradigm would produce an interference effect comparable to that of modified verbal Stroop paradigms, while providing a more ecologically valid measure of concerns pertinent to individuals "at risk" for or diagnosed with eating disorders. It was hypothesized that the interference score (latency of control stimuli subtracted from the latency of experimental stimuli) of the modified pictorial Stroop paradigm would positively and significantly correlate with other modified Stroop paradigms measuring eating, weight, and shape concerns; and that 2) the modified pictorial Stroop paradigm would produce a "Stroop interference effect", with participants producing significantly longer latencies on experimental stimuli, relative to control stimuli.

Methods

Participants

Thirty undergraduate female psychology students were offered research credit to participate in the pilot data collection. Participants were recruited via a sign-up sheet that was located in the alcove of the University of North Dakota psychology building, where most psychology experiments are advertised. Volunteer female students were contacted individually by telephone and asked to come into the laboratory for approximately one hour of testing. Participants ranged from 18 to 25 years of age ($M=19.43$, $SD=1.76$), and had a mean education level of 13.56 years ($SD=0.68$). The participants included in Pilot Study #2 had not participated in Pilot Study #1, and were excluded from the experiment proper.

Prior to the experiment, each participant was provided with a complete overview of the procedures and was asked to sign a written informed consent form outlining the risks and benefits of the study. See Appendix G. Each participant was assigned a privacy number to ensure confidentiality. All participants were treated in concordance with the ethical principles outlined in the Conduct of Research with Human Participants (American Psychological Association [APA], 1989).

Measures

Three separate Stroop paradigms were administered to each participant: the traditional Stroop (the Stroop Neuropsychological Screening Test (SNST; Trenerry et al., 1989); the modified verbal Stroop adapted from Cooper and Todd (1997); using eating, weight, and shape words and matched neutral words as stimuli; and the pictorial Stroop

paradigm, using female model pictures and home furnishing pictures as stimuli. The three Stroop paradigms are described below in detail.

Stroop Neuropsychological Screening Task (SNST; Trener et al., 1989). The SNST has proven to possess good clinical utility among various neuropsychological populations. The color-word task of the SNST reliably produces a strong interference effect in which the color name hinders the verbal report of the color of the ink. The Stroop procedure is reported to be a measure of specific higher cognitive functions, particularly the ability to shift between conflicting verbal response modes (Lezak, 1995).

The administration of the SNST involved two tasks, the Color Task and the Color-Word Task. The Color Task consisted of the presentation of a stimulus sheet containing 112 color names (red, green, blue, and tan) arranged in 4 columns of 28 names. The names were printed in one of the four colors, with no color name presented in its matching color. Each examinee was first presented with the Color Task stimulus sheet and asked to read the words aloud as quickly as possible. Subject responses were timed to the tenth of the second with a standard stopwatch.

The Color-Word Task consisted of a stimulus sheet similar to the one used in the Color Task, except for the order of the color names. The administration of the Color-Word Task required each subject to say aloud the color of the ink, rather than the word that is printed. Subject responses were timed and recorded to the nearest tenth of a second on a standard stopwatch. All errors were recorded.

Modified Verbal (Emotional) Stroop Color Naming Task (adapted from Cooper and Todd, 1997). This task consisted of six color naming tasks, each consisting of 50

words printed on a white card (8 ½" x 11") in five rows of ten words each. The words were printed in 16-point font, in block capital letters. Each word was printed in one of five colors (red, green, black, blue, and yellow) and each of the five stimulus words was repeated ten times. The task consisted of three target word cards (one for eating words, one for shape words, and one for weight words) and three matched-control word cards. The words on the control cards were matched to the words on the target cards for frequency, length, and part of speech. Words on the eating target card were: diet; biscuits; cakes; calories; eating. Words on the eating control card were: damp; amateurs; nests; fantasy; living. Words on the weight target card were: scales; pounds; heavy; weight; and one substitution was made from the Cooper and Todd (1997) study. The word "heft" was used in place of "stones" due to the colloquial nature of the word, and its uncommon usage in the United States. Words on the weight control card were: routes; guides; states; paper; native. Words on the shape target card were: fat; flabby; thighs; hips; shape. Words on the shape control card were: new; elated; medals; ward; field.

Standard instructions were used for the modified verbal Stroop. The following directions were read aloud to each subject, "On this page are some words. I would like you to name aloud the color of the ink - red, blue, green, yellow, or black - in which the word is printed. Go as quickly as you can, starting at the top of this first column. When you finish this column, go to the top of the next column and so on. If you make a mistake, correct yourself and keep on going. Try to name the color of the ink as quickly and accurately as you can". Time taken to name all of the words on each sheet was recorded to the nearest tenth of a second using a standard stopwatch. The three pairs of

cards were presented in a fully balanced design within each group, with target cards following the control cards.

Pictorial Adaptation to the Stroop Paradigm, Using Print Media Advertisements as Stimuli. A pictorial adaptation of the Stroop measure, with print media advertisements depicting female models and home furnishings as stimuli, was developed for use in this study. See Pilot Study #1 above for details on the creation of the task.

For this task, three decks of 54, 8 ½" x 11" laminated cards were used as stimuli. The first deck consisted of the control stimuli. This deck bore a color word (RED, GREEN, or BLUE) printed in incongruous colored ink on each white card. The color word was written in one-inch block capital letters and randomly placed in the center of the page at the top, middle, or bottom of the page. The second deck of cards consisted of the neutrally-rated home furnishings pictures generated from the first pilot study. Each card bore a black and white photograph of home furnishings on the page, with a color word (RED, GREEN, or BLUE) printed in incongruous colored ink superimposed over the center of the picture. The color word was written in one-inch block capital letters and randomly placed at the top, middle, or bottom of the photograph, as was the case with the first deck of cards. The third deck of cards consisted of the stimuli generated from the first pilot study, consisting of the 54 female model pictures. Each card bore a black and white photograph of a female model on the page, with a color word (RED, GREEN, or BLUE) printed in incongruous colored ink superimposed over the picture. The color word was written in one-inch block capital letters and randomly placed in the center of the page at the top, middle, or bottom of the photograph.

The 54 cards in each of the three decks were randomly ordered, numerically labeled, and presented in the same order each time. The presentation of the three sets of stimuli was counterbalanced across subjects.

For the administration of this task, the subject was seated at a table, facing three rectangular boxes. Each box was 12 inches in length, 10 inches in width, and 4 inches in depth. The boxes were uncovered. One box was labeled with the word RED written in the color red, one box was labeled with the word GREEN written in the color green, and one box was labeled with the word BLUE written in the color blue. The subject was handed one of the three decks of stimuli. The following instructions were read to the subject, "On each of these cards there is a color word printed in capital letters. Some of the color words are written in different colored ink. Using these cards, I would like you to read aloud the color of the ink the word is printed in and then place each individual card in the appropriate box labeled with the color each word is printed in. For example, if the word is printed in red ink, you would say "red", and place the card in the box marked "RED". Sort the cards as quickly and accurately as you can. If you make a mistake, correct yourself and keep on going." Subject's responses were timed to the nearest tenth of a second using a standard stopwatch. All errors were recorded. This procedure was repeated for all three sets of stimuli.

A manipulation check was conducted at the end of the administration. Subjects were shown 20 of the female model pictures presented in the task and 20 foil female model pictures and asked to identify whether or not they had seen the picture during the

administration. This was repeated using 20 of the home furnishing pictures and 20 foil home furnishing pictures.

Questionnaires

Following administration of the three Stroop paradigms and the manipulation check, all women were asked to complete five brief self-report measures and answer a series of questions relating to personal demographics, physical and mental health history, current weight status, attitudes towards obesity, and personal media usage. The questionnaires used in the study were selected for their ability to quantify features salient to eating disorders. The questionnaires are described below in detail. Questionnaires were assembled in booklet form, in a counterbalanced order.

Demographics and Personal History Questionnaire. This questionnaire was designed to obtain relevant demographic and personal history information from each participant. The questionnaire was divided into three sections: a demographic information section; a physical and mental health history section; and a personal history section including questions that pertain to self-reported weight status, attitudes towards obesity, and personal media usage. See Appendix H.

In the first section, each subject was instructed to provide self-reported demographic information, including age, education level, ethnicity, religious affiliation, marital status, number of children, living situation, hometown population, hometown location, and familial socio-economic status. Subjects were provided with categorical choices to guide their answers.

In the second section, subjects were asked a series of questions pertaining to physical and mental health status. Each woman was asked to rate her physical health on a 6-point Likert scale, ranging from 1 (poor) to 6 (excellent). Women were also asked specific questions relating to neurological status, academic history, psychological and psychiatric history.

In the third section of the questionnaire, participants were asked to provide information pertaining to self-reported weight status and body shape, personal attitudes towards obesity, and personal media usage and exposure. Subjects were to provide a self-reported estimate of their current weight (in pounds) and their current height (in feet and inches), and each woman's individual body mass index (BMI) was computed using a standard formula (weight in kilograms divided by height squared in meters). Each woman was asked to provide a self-evaluation of her current weight status (on a 5-point Likert scale ranging from "very underweight" to "very overweight") and to record her preferred or "ideal" weight (in pounds). Participants were also shown a series of seven pictorial body drawings adapted from Collins (1991), and instructed to first circle the body type closest to their current body shape, and then place an "X" over the body type that most closely represented their "ideal" body shape.

The next set of questions related to each individual's attitudes towards obesity. Subjects were asked to provide a "yes" or "no" response to a series of ten yes/no questions. Because of the lack of an available instrument that provides a measure of attitudes towards obesity, this series of questions was adapted from a chapter outlining discrimination and stigma associated with obesity in women (Rothblum, 1994).

The last set of questions was used to assess both the quantity and content of each participant's media usage. In the first two questions, subjects were asked to estimate the amount of exposure time (measured in hours and minutes) they have had to five various medium types (newspapers, magazines, movies, radio, television) over the past 24 hours and over the past two weeks. Next, subjects were asked to list the last three movies they had seen, and three favorite, or most watched, TV shows. Subjects were also asked to rate their preferences for five categories of magazines (beauty and fashion, entertainment and gossip, health and fitness, home and gardening, or news and current events).

Beck Depression Inventory-Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI has been widely accepted as a valid and reliable instrument to assess self-reported symptoms of depression in diagnosed patients and normal populations (Beck & Steer, 1987; Lezak, 1995). It is effective in interpreting the presence and intensity of depressive symptomatology. The second edition of the inventory was developed to correspond with the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition's (DSM-IV; American Psychiatric Association [APA], 1994) criteria for depressive disorders (Beck et al., 1996). See Appendix I. The BDI-II has strong internal consistency (for outpatients, $\alpha=.92$, and for college students, $\alpha=.93$) and high test-retest reliability ($r=.93$; Beck et al., 1996). The BDI-II has also been shown to correlate significantly with other measures of depression and anxiety (Beck et al., 1996).

The BDI-II consists of 21 items, each item containing four graded statements of symptom severity. Statements pertain to affective, cognitive, motivational, and physiological depressive symptoms. The statements are scored from 0 (absence of

symptom) to 3 (most severe problem area). The total score is the sum of all statements (range 0 to 63). Classification of the severity of depression according to BDI-II score is generally defined as 0 to 13 absence of or minimal depression, 14 to 19 mild depression, 20 to 29 moderate depression, and 30 to 63 severe depression (Beck et al., 1996).

Bulimia Test-Revised (BULIT-R; Thelen, Farmer, Wonderlich, & Smith, 1991).

The Bulimia Test is a scale originally developed by Smith and Thelen (1984) for the assessment of symptoms consistent with the disorder of bulimia. Thelen et al. (1991) revised the original instrument to correspond with the diagnostic criteria changes that occurred for bulimia nervosa in the revision of the Diagnostic and Statistical Manual of Mental Disorders-Third Edition- Revised (DSM-III-R; APA, 1987). See Appendix J. The instrument was constructed by comparing responses of clinically identified female bulimics with a group of normal female college students on several items. The purpose of the device is to distinguish between individuals who exhibit diagnostic symptomatology for bulimia nervosa and those with no eating problems or those with other eating disorders. In addition, the original test was designed to assess the severity of specific bulimic behaviors.

The revision of the BULIT-R proves to have adequate diagnostic predictive ability, sufficient construct validity, high internal consistency (Cronbach's $\alpha=.97$), and high test-retest reliability ($r=.95$; Thelen et al., 1991). It also has demonstrable validity and reliability for the assessment of bulimia nervosa in both clinical and non-clinical populations (Thelen et al., 1991).

The BULIT-R has been revised to a 36-item self-report measure, with items presented in a 5-point format. Responses are scored by assigning up to 5 points for items endorsed that are consistent with bulimia nervosa, and down to 1 point for items that are consistent with normal behavior. Scores range between 28 and 140. The BULIT-R is designed as a screening instrument and should be followed up by a clinical interview to aid in diagnosis. It is reported that individuals who score above the 104-point cut-off will likely be diagnosed with bulimia nervosa on interview. The authors suggest, however, that a more liberal classification strategy be used for screening purposes, to reduce the number of false negatives (Thelen et al., 1991).

Revised Restraint Scale (RRS; Herman & Polivy, 1980). The Restraint Scale was originally developed by Herman and Polivy (1975) to derive a behavioral parallel between obese individuals and food deprived control subjects in their response to anxiety. The purpose of the scale was to assess the extent to which individuals exhibit behavioral and attitudinal concerns about dieting and weight control. The revised measure is comprised of two subscales, each consisting of five questions (Herman & Polivy, 1980). See Appendix K. The items in the first subscale pertain to the respondent's diet and weight history. This subscale has an internal consistency coefficient of $\alpha=.68$ (Herman & Polivy, 1975). The items in the second subscale are related to the subject's food related thoughts and behaviors. The second subscale has an internal consistency coefficient of $\alpha=.62$ (Herman & Polivy, 1975). The correlation between the scores on the two subscales is $r=.48$, indicating adequate internal reliability (Herman & Polivy, 1975). The ten items are presented in a multiple-choice format, with

individual responses corresponding with specific point values between 0 and 4. Higher scores on the RRS indicate high eating restraint and the endorsement of atypical eating attitudes and behaviors (Herman & Polivy, 1980). Patients diagnosed with anorexia nervosa score significantly higher on the RRS than dieting college students (Herman & Polivy, 1980). According to data from Perpina et al. (1993) subjects are considered to be restrained eaters if they obtain a score above 15 on the RRS.

Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; Heinberg, Thompson, & Stormer, 1995). This 14-item questionnaire was developed to measure: 1) recognition and awareness of societal influence on esthetic standards of appearance and; 2) the degree to which the individual endorses, accepts, or internalizes these messages (Heinberg, et al., 1995). See Appendix L. Previous studies have documented the salient role that prescribing to the “thin ideal” stereotype plays in the development of body image disturbance and eating disorder pathology in women (Kendler, MacLean, Neale, Kessler, Heath, & Eaves, 1991; Mintz & Betz, 1988). Kendler et al. (1991) reported that endorsement and internalization of societal standards of beauty predicted subsequent diagnosis of bulimia. The SATAQ questionnaire provides a method of documenting awareness and acceptance of societal attitudes of thinness and attractiveness. The measure consists of two separate subscales, each having acceptable internal consistency, as measured by Cronbach’s alpha; $\alpha = .71$ for the 6-item Awareness subscale and $\alpha = .88$ for the 8-item Internalization subscale (Heinberg et al., 1995).

Respondents rate their level of agreement with each statement on a 5-point Likert scale (1 = completely disagree, 5 = completely agree). Analyses of the construct

validity of the SATAQ revealed good convergence between the SATAQ and other measures of body image and eating disturbance, with a slight tendency for values to be higher for the Internalization scale (range = .36 to .61) than for the Awareness scale (range = .28 to .44); (Heinberg et al., 1995). Regression analyses revealed that both subscales account for unique variance associated with eating disorder pathology (Heinberg et al., 1995). A raw score above 29 is indicative of an individual who exhibits high levels of endorsement, acceptance, or internalization of society's esthetic standards of appearance (Heinberg et al., 1995).

Liberal Feminist Attitude and Ideology Scale (LFAIS; Morgan, 1996). Because of the underlying feminist ideology that is often associated with the sociocultural model of eating disorders (Raphael & Lacey, 1992), it seemed appropriate to include a questionnaire measuring the level to which women in this sample subscribe to feminist ideals. Morgan (1996) developed this measure as a means to assess gender role attitudes and endorsement of feminist goals and ideology. See Appendix M. Traditional "feminism" scales have primarily included items that assess individual's attitudes toward sex roles, rather than broader ratification of the tenets of feminism (Dempewolf, 1974; Fassinger, 1994; Kirkpatrick, 1936). The LFAIS was developed to provide a more global measure of feminist attitudes (Morgan, 1996). Items were selected on the basis of feminist research on the theoretical underpinnings of feminist ideals (Morgan, 1996). The full scale consists of 60-items, however, 11 items from the original LFAIS were found to reliably predict feminist related behaviors. Cronbach's alpha on the eleven item short form was reported at $\alpha=.81$. In addition, neither the original form nor the short

form appear to be influenced by socially desirable responding. The 11 item short form was used for screening purposes in the present study. Item statements on the LFAIS were presented and respondents were asked to indicate their level of agreement to each item on a 6 point Likert-type scale, ranging from “strongly agree” to “strongly disagree”. Item responses are coded such that a high score suggests a strong feminist position. Four of the eleven items are subjected to reverse scoring.

Procedures

Subjects were tested individually in a private room by a trained research assistant. The order of the three individual Stroop task administrations were counterbalanced within each paradigm, and across subjects so that the effects of fatigue and practice were spread evenly across stimuli. Questionnaires were administered at the end of the session to reduce the risk of priming participants to focus on concerns relevant to eating, weight, or shape.

Due to the nature of Stroop stimuli, impairment in color vision is a potential confounding effect in Stroop performances. Therefore, prior to the administration of the Stroop paradigms, each participant was asked to identify and name color patches. All participants reported having normal color vision and all participants correctly identified the colors of six colored patches. Because of the low incidence of females with color blindness, this measure was considered sufficient for color vision testing in this subject group (Nolte, 1999).

At the completion of the session, each participant was debriefed and given research credit for her participation. Subjects who participated in this pilot study were excluded from the experiment proper.

Results

Table 1 provides the means and standard deviations of participant demographic and questionnaire data.

Table 1

Demographic and Questionnaire Means and Standard Deviations

Variable	Minimum	Maximum	Mean	<u>SD</u>
Age	18	25	19.43	1.76
Education	13	15	13.57	0.68
BULIT-R	31	87	50.23	14.23
BDI	1	26	9.70	6.10
RRS	3	30	13.73	5.91
SATAQ (awareness)	12	30	20.07	4.19
SATAQ (internalization)	15	39	27.90	5.68
LFAIS	30	53	39.90	5.13

The first hypothesis examined whether the modified pictorial Stroop paradigm could produce an interference effect comparable to that of modified verbal Stroop paradigms. It was hypothesized that the interference score of the modified pictorial Stroop paradigm would positively and significantly correlate with other modified Stroop paradigms. Zero order correlations were calculated using interference scores from the four modified Stroop paradigms used in the study (the modified pictorial Stroop paradigm and the three modified verbal Stroop paradigms). Interference scores from the

modified pictorial Stroop paradigm were positively and significantly correlated with interference scores from eating ($r[30]=.46$, $p=.01$) and weight ($r[30]=.51$, $p<.001$) verbal Stroop paradigms, and positively correlated with the interference score from the shape verbal Stroop paradigm ($r[30]=.35$, $p=.06$), with the correlation approaching significance.

The second hypothesis examined if the modified pictorial Stroop paradigm would produce an overall “Stroop interference effect”. A series of paired samples *t*-tests was conducted on data derived from the pictorial Stroop paradigm in order to assess for the presence of an interference effect. A “Stroop interference effect” was operationally defined as the presence of significantly longer card sorting speeds on experimental stimuli, relative to control stimuli. See Table 2 for a visual representation of the results.

Table 2

Results of Paired Samples *t*-test on Modified Pictorial Stroop Interference Data

Mean Latency Score (in seconds)

<u>Modified Pictorial</u>	<u>Experimental Cond.</u>	<u>Control Cond.</u>	<u>Interference (E-C)</u>	<u>t-statistic</u>
Model – Ctrl. Stimuli	72.33	67.06	5.27	5.22**
Neutral – Ctrl. Stimuli	71.06	67.06	4.00	4.05**
Model Stimuli (-) Neutral Stimuli	72.33	71.06	1.27	1.31

* $p<.05$, ** $p<.01$

First, the latency score of sorting color incongruent words printed on a blank sheet (control condition) was subtracted from the latency score of sorting color incongruent words printed on salient female model stimuli (experimental condition). A significant

interference effect was found ($t[29]=5.22, p<.0001$). This finding demonstrates a significant Stroop interference effect using the modified card sorting pictorial Stroop paradigm, suggesting that participants were significantly slower in sorting the salient female model stimuli (experimental condition), relative to the incongruent color/plain background stimuli (control condition). This finding supports the existence of a significant overall “Stroop interference effect” using the modified card sorting pictorial Stroop paradigm.

Next, the latency score of sorting color incongruent words printed on a blank sheet (control stimuli) was subtracted from the latency score of sorting color incongruent words printed on neutrally-rated pictures of home furnishings (experimental stimuli). A significant interference effect was found ($t[29]=4.05, p<.0001$), again suggesting a significant Stroop interference effect exists with the modified card sorting pictorial Stroop paradigm.

Finally, the latency score of sorting color incongruent words printed on neutrally-rated home stimuli (control condition) was subtracted from the latency score of sorting color incongruent words printed on salient female model stimuli (experimental condition). Although this effect was not statistically significant ($t[29]=1.31, p=.20$), the latency of the experimental condition ($M=72.33$) was greater than the latency score of the neutral stimuli ($M=71.06$). This suggests that overall, female subjects had more difficulty inhibiting stimuli containing pictorial advertisements of thin-rated female models, relative to stimuli containing advertisements of neutrally-rated home furnishings.

However, using whole-group data consisting of women with differing levels of eating disordered symptoms, a statistically significant interference effect was not found.

Therefore, it was of further interest to determine if a significant interference effect would be found between salient female model stimuli (experimental condition) and neutrally-rated home stimuli (control condition), if participants were divided into two groups, based on self-reported levels of bulimic symptomatology. It was hypothesized that women with mild to moderate levels of bulimic symptomatology would show a significant interference effect between salient female model stimuli (experimental condition) and neutrally-rated home stimuli (control condition), suggesting that they would have significantly more difficulty inhibiting “thin-ideal” stimuli, relative to neutral stimuli.

Based on this hypothesis, participants were divided into groups on the basis of scores obtained on the Bulimia Test-Revised (BULIT-R). Two groups were formed: Group 1 (n=15) included women scoring below 50 (range=31 to 49) on the BULIT-R, signifying no or minimal bulimic symptoms, and Group 2 (n=15) included women scoring at or above 50 (range 50 to 87) on the BULIT-R, signifying the presence of mild to moderate bulimic symptoms. A mixed model analysis of variance (ANOVA) was performed with group (women scoring >50 on the BULIT-R vs. women scoring <50 on the BULIT-R) as the between subjects factor and condition (experimental [color sorting salient female model stimuli] versus control [color sorting neutral home furnishing stimuli]) as the within subjects factor.

The omnibus F did not show a significant overall effect ($F[1, 28]=1.94, p>.05$). Simple effect analyses did not show a significant effect for group ($F[1, 28]=.49, p>.05$), nor a significant effect of condition for Group 1 (women with BULIT-R scores below 50; $F[1, 14]=-0.45, p=.66$). However, there was a significant effect of condition for Group 2 (women with BULIT-R scores above 50; $F[1,14]=4.31, p<.05$), and a significant group by condition interaction effect was observed ($F[1,28]=4.86, p<.05$). See Table 3.

Table 3

Mean Times (in Seconds) to Color Sort Thin Rated Female Model Stimuli and Neutral-Rated Home Furnishing Stimuli

Mean Latency Score (in seconds)

<u>Group</u>	<u>Female Model</u>	<u>Home Furnishing</u>	<u>Int.</u>
Group 1 (<50)	72.54	73.29	-.75
Group 2 (>50)	72.12	68.83	3.29*
Totals	72.33	71.06	1.27

* $p<.05$

The significant group by condition interaction suggests that 1) the control group (women with BULIT-R scores <50) did not experience a reliable amount of interference, meaning that these women were suppressing both neutral and thin ideal stimuli in the same manner, and 2) the “at risk” group (women with BULIT-R scores >50) were experiencing a significant amount of interference, meaning that these women were having more difficulty suppressing thin ideal stimuli than neutral stimuli. The results suggest that the modified pictorial Stroop paradigm produced a reliable interaction between the level of reported bulimic symptoms and the amount of interference between

test stimuli. This finding provides support for the utility of the pictorial Stroop paradigm, and the data support the hypothesis that women with bulimic symptoms have more difficulty suppressing thin-depicting media stimuli.

Although not part of the initial hypotheses, it is of interest that Group 1 ($M=23.87$, $SD=4.26$) and Group 2 ($M=23.27$, $SD=3.41$) women did not significantly differ in their performance on the female model manipulation task ($t[28]=.43$, $p>.05$). Nor, did Group 1 ($M=20.00$, $SD=4.23$) differ from Group 2 ($M=20.07$, $SD=3.81$) on the home furnishing manipulation task ($t[28]=-.05$, $p>.05$). This suggests that the significant group by condition interaction was not simply due to better encoding of pictorial information by either group. Since both groups were performing at chance and near-chance levels (20 of 40 correct and 23 of 40 correct), it can be assumed that neither group was primarily focused on encoding the pictures.

Supplementary Analyses

Further exploratory analyses were conducted on paired data from the SNST and the three modified verbal Stroop paradigms (see Table 4). Using overall group data, the latency score from the color reading (control condition) was subtracted from the color-word reading (experimental condition) of the SNST. A significant interference effect was found ($t[29]=24.05$, $p<.0001$). The latency score from the color reading "shape" words (experimental condition) was used to subtract the latency score from color reading matched neutral words (neutral condition). For this paradigm, a significant interference effect was found ($t[29]=3.84$, $p=.001$). This finding suggests that women had significantly more difficulty inhibiting shape-related stimuli than neutral stimuli. The

latency score from color reading the “weight” words (experimental condition) was used to subtract the latency score of color reading matched neutral words (neutral condition). Again, a significant interference effect was found ($t[29]=3.02, p<.01$), suggesting stimuli associated with weight-related stimuli caused more interference than neutral stimuli during a color reading task.

The latency score from color reading the “eating” words (experimental condition) was used to subtract the latency score from color reading matched neutral words (neutral condition). This effect was not significant ($t[29]=1.25, p=.22$). Of note, however, the latency of color reading salient “eating” words ($M=35.63$) was greater than the latency of color reading neutral words ($M=34.61$). This suggests that participants had more difficulty inhibiting stimuli related to “eating” words than inhibiting neutral stimuli; however, the effect was not statistically significant.

Table 4

Results of Paired Samples t-test on Modified Verbal Stroop Interference Data

	Mean Latency Score (in seconds)			t-value
	Experimental Cond.	Control Cond.	Interference (E-C)	
SNST	105.30	50.18	55.12	24.05**
<u>Modified Verbal</u>				
Shape Words	36.99	33.61	3.38	3.84**
Weight Words	34.74	32.59	2.15	3.02**
Eating Words	35.63	34.61	1.02	1.25

** $p<.01$

Using data derived after dividing the women into groups, a series of independent samples t -tests was run using Stroop interference scores as dependent variables. See Table 5 for a visual presentation of data. As expected, group performance did not significantly differ on the SNST ($t[28]=1.03$, $p=.31$). The two groups did significantly differ in their performance on the interference score between “eating” words and neutral words ($t[28]=-2.16$, $p<.05$). The analysis revealed that women with mild to moderate bulimic symptoms had significantly more difficulty inhibiting the effect of salient “eating” words, relative to women with no or minimal bulimic symptoms.

Table 5

Results of Independent Samples t -Test Using Stroop Interference Scores

Stroop Paradigms	<u>Interference Score by Group (Exp-Ctrl)</u>		
	Group 1 (<50)	Group 2 (>50)	t -value
SNST	57.48	52.76	1.03
<u>Modified Verbal</u>			
Eating Words	-.64	2.67	-2.16*
Weight Words	1.13	3.17	-1.46
Shape Words	2.63	4.12	-.84

* $p<.05$

The difference between the two groups did not significantly differ in the analysis of the interference score on the “weight” words ($t[28]=-1.46$, $p=.16$); however, the women in Group 2 (scoring at or above 50 on the BULIT-R) demonstrated more

interference ($M=3.17$, $SD=2.75$) on salient “weight” words than those women scoring below 50 ($M=1.13$, $SD=2.75$). This difference, however, was not statistically significant.

The groups also did not significantly differ on interference scores of “shape” words ($t[28]=-0.84$, $p=.41$), although Group 2 ($M=4.12$, $SD=5.52$) again showed more interference than Group 1 ($M=2.63$, $SD=4.07$). The distributions of the weight and shape verbal Stroop data differed from normality. These findings may have decreased the ability to detect statistical significance on these variables.

Discussion and Conclusions

The results of this pilot study provide evidence for the applicability of the modified pictorial Stroop paradigm using print media advertisements as stimuli as a measure of inhibitory control. It was demonstrated that the modified pictorial Stroop paradigm produces interference effects comparable to those of the modified verbal Stroop paradigms. Specifically, the interference score from the modified pictorial Stroop was positively and significantly correlated with the interference scores from the eating and weight verbal Stroop tasks, and positively correlated with the interference score from the shape verbal Stroop task.

Further analyses revealed that the modified pictorial Stroop paradigm was able to demonstrate an adequate interference effect, signifying that subjects were slower to sort experimental stimuli relative to control stimuli. Furthermore, when performances on the modified pictorial Stroop paradigm were analyzed after dividing women into two groups on the basis of scores obtained on the BULIT-R, a significant group by condition interaction was observed. Specifically, women who endorsed mild to moderate risk

factors for bulimia experienced a significant amount of interference on the task, meaning that these women were having more difficulty suppressing thin ideal stimuli than neutral stimuli. The results suggest that the modified pictorial Stroop paradigm produced a reliable interaction between the level of reported bulimic symptoms and the amount of interference between the two stimuli.

The application of the structure building framework described by Gernsbacher (1990) may be useful to explain this phenomenon. The results of this pilot study provide evidence of a possible breakdown in inhibitory control (inefficient suppression) for women endorsing symptoms consistent with the syndrome of bulimia nervosa. Impaired suppression has been used to explain deficient inhibitory processes across a number of diverse subject groups (Gernsbacher & Faust, 1991; Duchek et al., 1995). This model may also be used to explain the difficulty demonstrated by women with mild to moderate bulimic symptoms in inhibiting thin-depicting media information. It is quite possible that inefficient inhibitory processes provide a means by which these women are more susceptible to the negative effects of thin-depicting media.

The findings from this pilot study provide evidence for the applicability of the modified pictorial card sorting Stroop using media pictures as stimuli as an effective measure of inhibition and interference in women reporting bulimic symptoms. Given these findings it was determined that this measure could be used to address the role of inhibitory dyscontrol in a sample of women reporting moderate to high levels of bulimic symptoms.

CHAPTER III

METHOD

Phase I: Screening Session

Participants

The experiment consisted of two phases: Phase I (Screening Session) and Phase II (Laboratory Neuropsychological Testing Session). During Phase I of the study, 277 undergraduate females were asked to participate in a 40 minute screening session designed to recruit participants for Phase II. Participants in Phase I ranged from 18 to 34 years of age ($M=19.58$, $SD=1.78$), with a mean education level of 13.72 ($SD=0.88$). Some screening sessions were offered during undergraduate psychology class periods at the University of North Dakota and some sessions were held separately outside of class hours. Advertisement flyers were used to announce the times and dates of separate screening sessions to undergraduate females.

During the screening sessions, the potential participants were asked to complete five brief self-report measures (described in detail in Pilot Study #2), and scores on these scales were used to determine each participant's eligibility for Phase II. Subjects received research credit in exchange for their participation in the screening session.

Measures (Questionnaires) and Procedure

During specified screening sessions, potential participants were asked to complete the following self-report measures: the Beck Depression Inventory (BDI); the Bulimia

Test-Revised (BULIT-R); the Revised Restraint Scale (RRS); the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ); and the Liberal Feminist Attitude and Ideology Scale (LFAIS). Participants were also asked to answer a series of questions relating to personal demographics, physical and mental health history, current weight status, attitudes towards obesity, and personal media usage. The aforementioned measures were selected for their ability to quantify features salient to the current study. The questionnaires were described in detail in Chapter 2, Pilot Study #2.

The questionnaires were assembled in booklet form, in a counterbalanced order. See Appendices H-M. Each questionnaire in the booklet was marked with an individual participant number at the top of each page. Questionnaire booklets were placed inside of a separate manila envelope at the time of distribution to potential participants. A corresponding participant number was written on the outside of the manila envelope, along with two blank lines, labeled "NAME" and "TELEPHONE NUMBER" accordingly. Questionnaire booklets were constructed in this manner in order to ensure that no participant names were written on any of the individual questionnaires. Each woman was specifically instructed to print her name and telephone number on the outside of the manila envelope, and was asked to place the questionnaire booklet back in the manila envelope upon completion.

Prior to filling out the questionnaires, each woman signed a written informed consent form. See Appendix N. The consent form was utilized to prepare each woman for the sensitive nature of the questions and to outline the confidential nature of the screening session. Participants were asked to read the consent form, and to sign it if they

agreed to participate in the screening session. Each woman was also verbally informed that she could leave some questions unanswered and that she could discontinue participation at any time without penalty. Participants were encouraged to ask questions or raise any concerns they had about the screening instruments or the study.

Phase II

Participants

Sixty (n=60) females participated in Phase II of the study, none of which had participated in Pilot Study #1 or Pilot Study #2. These women were asked to come into the laboratory to complete a battery of neuropsychological tasks. Participants were divided into two groups, Group 1: a normal control group (scores below 40 on the BULIT-R), and Group 2: an “at-risk” for eating disorder group (scores above 80 on the BULIT-R). Each group included thirty (n=30) participants.

Selection of Participants for Phase II

Exclusionary Criteria. Potential participants were selected on the basis of self-report questionnaire responses and obtained scores on the screening measures. Specific exclusionary criteria included: any known current or past diagnosis or treatment of eating disorder; any present diagnosis or treatment of affective illness; any current or past history of substance abuse or dependence; any current or past history of known psychiatric disturbance; any history of significant head injury or neurological disease; and any known history of learning disability. Women who positively endorsed these questions on the demographic questionnaire were not considered for inclusion in Phase II of the study.

1958). The test consists of two parts. During Trails A, the examinee is asked to consecutively connect numbered circles. During Trails B, the examinee is asked to consecutively connect numbered and lettered circles on a second worksheet by alternating between the two sequences. For both tasks, the examinee is encouraged to work as quickly as possible without lifting their pencil from the paper. Performances are scored by the amount of time required to finish each portion of the test and the number of errors made.

Motor speed, visual scanning, and agility all contribute to superior performance on both Part A and Part B of this task (Lezak, 1995). Trails B also provides a measure of cognitive flexibility and is a measure of the executive functioning. Most reliability coefficient reports are above $\alpha=.60$ and several are in the $\alpha=.80$ to $.90$ range (Lezak, 1995).

Paced Auditory Serial Addition Test (PASAT). The PASAT is a neuropsychological test that measures mental tracking and rate of information processing. It is a highly demanding and frustrating task, leaving it sensitive to minor neuropsychological deficits (Lezak, 1995). Examinees are presented with an auditory tape recording in which numbers are read one after another. Examinees are asked to add the numbers together, adding each number to the immediately preceding number, and verbally give their answers. Sixty pairs of randomized digits are presented. The speed at which the numbers are presented gets progressively faster over four trials. Performance is generally evaluated by recording the percentage of correct responses or a mean score. The PASAT has a split-half reliability of about $r=.90$, indicating the test has high internal

consistency (Lezak, 1995). Cronbach's alpha is reported to be $\alpha=.90$ on the four PASAT trials.

Benton Visual Retention Test (BVRT). The BVRT is a widely used measure of visual memory. This test provides a quick measure of visual perception, visual memory, and visuo-constructive abilities and is often used to identify difficulties in cognitive functioning. The BVRT consists of 10 cards with simple geometric figures, presented in sequential and standardized order. Administration A allows the examinee to study each card for 10 seconds. The design is then covered, and the examinee is asked to reproduce the design on a blank sheet of paper. The test provides two scores, the number correct and the number of errors. Inter-rater reliabilities of $r=.96$ have been reported for number correct and $r=.97$ for number of errors (Lezak, 1995). The BVRT has high reliability and coefficients between $\alpha=.72$ and $\alpha=.77$ have been obtained for administration (Lezak, 1995).

Stroop Neuropsychological Screening Test (SNST), Modified Verbal Stroops, using eating, weight, and shape words, and the Modified Pictorial Stroop, using print media pictures as stimuli. These three Stroop paradigms were administered during Phase II. Refer to Chapter 2, Pilot Study #2 for a detailed explanation of these tasks.

Eating Disorder Examination (EDE). The EDE is a standardized instrument designed for the assessment of psychopathology specific to eating disorders (Cooper & Fairburn, 1987). It is administered as an investigator-based interview, and provides basic descriptive information on the degree of behavioral disturbance in terms of five subscales. The subscales are: Bulimia, Restraint, Eating Concern, Shape Concern, and

Weight Concern. The EDE has demonstrable reliability and validity (Cooper & Fairburn, 1987). For the purposes of this study, the EDE was rewritten in a more simplified format.

See Appendix R.

CHAPTER IV

RESULTS

Overview of Analyses

A series of analyses was conducted based on the following a priori hypotheses:

1) it was hypothesized that the modified pictorial Stroop paradigm would produce an interference effect comparable to that of modified verbal Stroop paradigms, while providing a more ecologically valid measure of concerns pertinent to individuals “at risk” for, or diagnosed with eating disorders. It was hypothesized that this could be demonstrated through positive and significant correlations between the interference score of the modified pictorial Stroop paradigm and the interference scores of the modified verbal Stroop paradigms measuring eating, weight, and shape concerns. It was also hypothesized that the modified pictorial Stroop paradigm would produce a “Stroop interference effect”, with participants producing significantly longer latencies on experimental stimuli, relative to neutral stimuli. 2) it was hypothesized that women with moderate to high bulimic symptoms (Group 2) would exhibit less efficient inhibition when presented with print “thin-ideal” media stimuli, in comparison to control (Group 1) women. Inefficient inhibition would be demonstrated by the existence of a “Stroop interference effect” on the modified pictorial Stroop, in that Group 2 women would be slower at sorting cards with thin-depicting media pictures as background stimuli than they were at sorting cards with neutrally-rated home furnishing pictures as background

stimuli. 3) it was also hypothesized that the results presented by Cooper and Todd (1997), suggesting that anorexic and bulimic patients demonstrate selective processing of eating, shape, and weight information relative to normal control subjects would be replicated in a sample of women “at risk” for bulimia nervosa. 4) it was hypothesized that women reporting higher levels of bulimic symptoms would exhibit a trend towards poorer performance on measures of executive functioning, since executive function is often linked to performance decrements in the ability to inhibit. 5) finally, it was hypothesized that women reporting higher levels of eating restraint would show more difficulty on visuo-spatial tasks.

Analyses

Prior to testing the five major hypotheses, data screening was conducted to ensure that the variables met criteria for the use of parametric statistics. Normality screening revealed data from the modified pictorial Stroop paradigm were positively skewed (skewness > .30) and differed moderately from normal (Tabachnick & Fidell, 2001). A square root transformation was determined to be the most appropriate transformation strategy (Tabachnick & Fidell, 2001). As a result, all analyses involving the modified pictorial Stroop paradigm were performed on transformed scores.

Hypothesis 1

To test the first hypothesis examining whether the modified pictorial Stroop paradigm could produce an interference effect comparable to that of modified verbal Stroop paradigms, zero order correlations were calculated using interference scores from the modified Stroop paradigms. The interference score (experimental female model

stimuli - control home furnishing stimuli) from the modified pictorial Stroop was positively and significantly correlated with interference scores from the weight ($r[60]=.30, p<.05$) and the shape ($r[60]=.29, p<.05$) verbal Stroop paradigms, and positively correlated with the interference score from the eating verbal Stroop ($r[60]=.22, p=.09$), with the correlation approaching significance.

A series of paired t -tests was conducted on data derived from the pictorial Stroop paradigm to assess the presence of an overall "Stroop interference effect". A "Stroop interference effect" was considered to be present if participants produced significantly longer card sorting speeds on experimental stimuli, relative to control stimuli. See Table 9 for a visual presentation of the results.

Table 9

Results of Paired Samples t -test on Modified Pictorial Stroop Interference Data

	Mean Latency Score In Seconds			
	<u>Experimental Cond.</u>	<u>Control Cond.</u>	<u>Interference (E-C)</u>	<u>t-value</u>
<u>Modified Pictorial</u>				
Model – Ctrl. Stimuli	66.74 (8.14)	62.20 (7.85)	4.54 (.29)	4.39**
Neutral – Ctrl. Stimuli	64.92 (8.01)	62.20 (7.85)	2.72 (.16)	2.46*
Model Stimuli (-) Neutral Stimuli	66.74 (8.14)	64.92 (8.01)	1.82 (.13)	2.51*

* $p<.05$, ** $p<.01$

Note. Data reported in table are original untransformed mean latency scores; data in parentheses reflect transformed mean latency scores.

First, the latency score of sorting color incongruent words printed on a blank sheet (control condition) was subtracted from the latency score of sorting color incongruent

words printed on salient female model stimuli (experimental condition). A significant interference effect was found ($t[59]=4.39, p<.01$). Overall, participants were significantly slower in sorting the salient female model stimuli (experimental condition), relative to the incongruent color/plain background stimuli (control condition). This finding suggests that the presence of thin-depicting female model background stimuli interferes with Stroop card sorting performances, and gives credence to the existence of a significant overall “Stroop interference effect” using the modified card sorting pictorial Stroop paradigm.

Next, the latency score of sorting color incongruent words printed on a blank sheet (control stimuli) was subtracted from the latency score of sorting color-incongruent words printed on neutrally-rated pictures of home furnishings (experimental stimuli). A significant interference effect was found ($t[59]=2.46, p<.05$), suggesting that the presence of neutrally-rated home furnishing background stimuli also interferes with Stroop card sorting performances.

Finally, the latency score of sorting color incongruent words printed on neutrally-rated home stimuli (control condition) was subtracted from the latency score of sorting color incongruent words printed on salient female model stimuli (experimental condition). A significant interference effect was found ($t[59]=2.51, p<.05$). This suggests that overall, women were slower at color sorting advertisements depicting “thin ideal women” relative to advertisements depicting neutrally-rated stimuli. This finding supports hypothesis 1, indicating that the modified pictorial Stroop produces an overall “Stroop interference effect” that is comparable to that of other modified Stroop

paradigms. This Stroop interference effect is unique in that it uses stimuli with optimal external validity for concerns salient to women at risk for, or diagnosed with, eating disorders.

Hypothesis 2

Hypothesis 2 examined if women with moderate to high bulimic symptoms (Group 2) would demonstrate less efficient inhibition when presented with print “thin ideal” media. Inefficient inhibition would be demonstrated by the existence of a “Stroop interference effect” on the modified pictorial Stroop, with interference measured as the latency difference between the card sorting time of salient thin ideal female model stimuli and the card sorting time of neutral home furnishing stimuli. Specifically, it was hypothesized that Group 2 women would differ significantly between the two stimuli conditions, in that they would demonstrate longer card sorting latencies in response to “thin ideal” stimuli, relative to “neutral” stimuli.

A mixed model analysis of variance (ANOVA) was performed with group (controls vs. “at-risk”) as the between subjects factor and condition (experimental [female model stimuli] vs. control [neutral home stimuli]) as the within subjects factor. The omnibus F showed a significant overall effect ($F[1, 58]=6.78, p<.05$). Simple effect analyses indicate a significant main effect for group (control versus “at risk”; $F[1, 58]=6.09, p<.05$) and a significant main effect of condition for Group 2 (“at risk”) women ($F[1, 29]=3.81, p<.01$) but not for Group 1 (control) women ($F[1, 29]=.15, p=.88$). Most importantly, a significant group by condition interaction effect was observed ($F[1, 58]=5.62, p<.05$). See Table 10.

Table 10

Mean Times (in Seconds) to Color Sort Thin-Rated Female Model Stimuli and Neutral-Rated Home Furnishing Stimuli

<u>Group</u>	<u>Mean Latency Score (in seconds)</u>		
	<u>Female Model</u>	<u>Home Furnishing</u>	<u>Interference</u>
Group 1 (Controls)	69.71 (8.32)	69.72 (8.31)	-.01
Group 2 ("At Risk")	63.95 (7.95)	60.13 (7.71)	3.82* ^b , * ^c
Totals	66.83 (8.14)	64.92 (8.01)	1.91* ^a

* $p < .05$

Note. [Data reported in table are original untransformed mean latency scores; data in parentheses reflect transformed mean latency scores.] [^a indicates main effect of group, ^b indicates main effect of condition, ^c indicates group x condition interaction.]

The significant group by condition interaction indicates that Group 2 ("at-risk") women demonstrated a significant "Stroop interference effect" in response to thin-depicting media information. This means that Group 2 women had significantly more difficulty sorting cards with thin-depicting media pictures as background stimuli than they did sorting cards with neutrally-rated home furnishing pictures as background stimuli. Group 1 women, however, did not demonstrate a reliable interference effect. Specifically, Group 1 women did not differ in their performances across the two stimuli conditions, suggesting that these women were suppressing both neutral and thin ideal stimuli in the same manner.

This interaction effect suggests that Group 2 ("at-risk") women were more distracted by, or had more difficulty inhibiting (suppressing) thin-ideal female model stimuli. This finding gives credence to hypothesis 2, in that women with moderate to

high bulimic symptoms (Group 2) exhibit less efficient inhibition when presented with “thin-ideal” media stimuli.

Although not part of the initial hypotheses, it is of interest that Group 2 women actually demonstrated faster overall card sorting times, rather than slower card sorting times in comparison to Group 1 women. However, this increase in speed was associated with significantly more errors on the part of Group 2 women, in response to the thin female model stimuli. See Table 11.

Group 2 women made significantly more errors while sorting cards with thin-depicting media pictures as background stimuli, relative to Group 1 women ($F[1, 59]=10.03, p<.01$). The two groups did not significantly differ in the number of errors made while sorting cards with neutrally-rated home furnishing pictures as background stimuli ($F[1, 59]=3.52, p=.07$).

Table 11

Participant Error Rates for Color Sorting Thin-Rated Female Model Stimuli and Neutral-Rated Home Furnishing Stimuli

<u>Group</u>	<u>Error Rate (%)</u>	
	<u>Female Model</u>	<u>Home Furnishing</u>
Group 1 (Controls)	0.50	1.06
Group 2 (“At Risk”)	1.48**	0.31

* $p<.01$

This may suggest that women with moderate to high levels of bulimic symptomatology were trading speed for accuracy while sorting cards with thin-depicting media pictures as background stimuli. Speed accuracy trade offs have been reported in

previous studies examining the neuropsychological functioning of bulimic women (Beatty et al., 1990; Ferraro, et al., 1997a). Speed accuracy trade-offs often represent a neuropsychological index of poor impulse control, which is generally regarded as characteristic in women with bulimic symptoms (Heilbrun & Bloomfield, 1986), and consistent with the notion of inhibitory dyscontrol.

It was also of interest to examine the data from the manipulation check tasks. It was found that Group 1 ($M=26.07$, $SD=4.19$) and Group 2 ($M=26.37$, $SD=5.42$) women did not significantly differ in their performance on the female model manipulation task ($t[58]=-0.24, p=.81$). Nor did Group 1 ($M=20.67$, $SD=2.93$) differ from Group 2 ($M=19.93$, $SD=3.69$) on the home furnishing manipulation task ($t[58]=0.85, p=.40$). These results suggest that the significant group by condition interaction was not simply due to better encoding of pictorial information by either of the two groups. Since both groups were performing at chance and near-chance levels (approximately 26 correct responses of 40 on experimental stimuli and approximately 20 correct responses of 40 on control stimuli), it can be assumed that neither group was primarily focused on encoding the pictures. The lack of group differences on the manipulation tasks provides further evidence in support of hypothesis 2.

Hypothesis 3

The third hypothesis examined if the results of the Cooper and Todd (1997) study showing that anorexic and bulimic patients demonstrate selective processing of eating, shape, and weight information relative to normal control subjects, could be replicated in a sample of women "at risk" for bulimia nervosa. In order to test this hypothesis, three

interference scores were computed from data obtained on the eating, weight, and shape verbal Stroop paradigms. Interference scores represented differences in latency of color naming between each target card and its matched control card.

A series of independent samples *t*-tests was computed. See Table 12.

Table 12

Results of Independent Samples *t*-Test Using Modified Verbal Stroop Interference Scores

Stroop Paradigm	<u>Interference Score by Group (Exp-Ctrl)</u>		<i>t</i> -statistic
	Group 1 (Ctrls)	Group 2 (At-Risk)	
<u>Modified Verbal</u>			
Eating Words	.24	4.86	-4.46**
Shape Words	2.15	4.61	-2.81**
Weight Words	.73	2.98	-2.04*

p*<.05, *p*<.01

As expected, the two groups did significantly differ in their performance on the interference score between “eating” words and neutral words ($t[58]=-4.46$, $p<.05$), and the interference score between “weight” words and neutral words ($t[58]=-2.04$, $p<.05$), and the interference score between “shape” words and neutral words ($t[58]=-2.81$, $p<.05$).

This analysis suggests that women reporting moderate to high symptoms of bulimia nervosa had significantly more difficulty inhibiting the effect of salient “eating”, “weight”, and “shape” words, relative to women with no or minimal bulimic symptoms. This suggests that certain “at-risk” populations selectively process information related to concerns about eating, weight, and shape in the same manner as patients diagnosed with

anorexia nervosa and bulimia nervosa (Cooper & Todd, 1997). This finding supports hypothesis 3.

Hypothesis 4

The fourth hypothesis examined if women reporting higher levels of bulimic symptoms would show trends towards poorer performances on measures of executive functioning. In order to reduce the rather large number of executive functioning variables to a smaller number of components, a principle components analysis (PCA) was first performed. PCA is a widely accepted data reduction strategy often used to discover which variables in a set form coherent subsets that are relatively independent from another (Tabachnick & Fidell, 2001). To address the fourth hypothesis, PCA was used to generate identifiable groupings of variables reflecting characteristic domains of executive functioning. The PCA yielded four components subsequently labeled as: attention/inhibition; impulsivity; mental flexibility; and planning. In order to reduce the large number of variables, eight variables with the highest loadings for the four components (i.e., the two highest loading measures for each of the four components) were selected for inclusion in the analyses. Table 13 presents the four executive functioning domains and their constituent measures.

Scores for each subject on all eight measures were transformed into standardized z scores, and the two z scores for each of the executive functioning components were added together to yield a domain score. The four domain scores were added together for a final composite score of executive functioning. A one-way analysis of variance (ANOVA) was carried out using the composite executive functioning score as the

Table 13

Domains of Executive Functioning as a Function of PCA

Domain	Measures	Component Loadings
Attention/Inhibition	PASAT Series 4, Number Correct	.67
	SNST Percentile	.53
Impulsivity	Trailmaking Test, Part B Errors	.84
	Trailmaking Test, Part A Errors	.47
Planning	Rey Complex Figure Organization Percentile	.78
	Rey Complex Figure Copy – Planning Cum %age	.73
Mental Flexibility	WCST – Scaled Score Perseverative Errors	.82
	WCST – Number of Categories Completed	.79

dependent variable, and group (“at-risk” vs. controls) as the independent variable. The ANOVA yielded a significant result ($F[1, 59]=5.59, p<.05$). This suggests that, overall, women with bulimic symptoms appear to perform more poorly on measures of executive function, relative to women reporting minimal or no bulimic symptoms. This finding provides support for hypothesis 4.

Hypothesis 5

In order to test the fifth hypothesis, a multivariate analysis of variance (MANOVA) was computed using a cut-score of 16 on the Revised Restraint Scale (RRS) to differentiate between women with high and low levels of eating restraint as the independent variable. Twenty-eight women (47%) had scores greater than or equal to 16 on the RRS, leaving thirty-two women (53%) with scores lower than 16. Dependent measures consisted of visual-spatial memory tasks (Rey Complex Figure Immediate

Recall, Rey Complex Figure Delayed Recall, Benton Visual Retention Test [BVRT], Number Correct and Number Errors).

The omnibus F -statistic was not significant ($F[4, 55]=1.58, p=.19$). See Table 14. Therefore, the results do not provide support for the hypothesis that women with high levels of eating restraint demonstrate visuo-spatial impairments.

Table 14

Group Means and Standard Deviations of Visuospatial Tests

<u>Group</u>	<u>BVRT Correct</u>	<u>BVRT Errors</u>	<u>Rey Imm. T-score</u>	<u>Rey Delayed T-score</u>
High RRS	8.07 (1.25)	2.00 (1.41)	59.46 (8.75)	60.86 (10.12)
Low RRS	8.81 (1.12)	1.19 (1.12)	63.56 (10.60)	64.91 (9.64)

CHAPTER 5

DISCUSSION

Summary of Results

The present study yielded the following results: First, the applicability of a novel card-sorting, pictorial Stroop paradigm was demonstrated in Pilot Study #1, and those findings were replicated in the experiment proper. Specifically, hypothesis 1 of this study was supported, in that the modified pictorial Stroop paradigm produced an interference effect that was considered comparable to that of other modified Stroop paradigms, while providing a more ecologically valid measure of concerns pertinent to individuals “at risk” for or diagnosed with eating disorders. The modified pictorial Stroop was positively and significantly correlated with other modified Stroop measures, and also produced a significant overall “Stroop interference effect”, in that participants demonstrated significantly longer card sorting latencies on experimental stimuli, relative to neutral stimuli. Based on these results, it was determined that the modified pictorial Stroop paradigm serves as a good measure of inhibition in a sample of women with bulimic symptoms.

Second, hypothesis 2 was also supported, in that women with moderate to high bulimic symptoms (Group 2) showed less efficient inhibition when presented with print “thin-ideal” media stimuli. This was determined by an observed group by condition interaction on the modified pictorial Stroop task. Specifically, women with bulimic symptoms

(Group 2) demonstrated a “Stroop interference effect” when sorting cards with thin-depicting media pictures as background stimuli, whereas women with no or minimal bulimic symptoms (Group 1) did not demonstrate this effect. This suggests that Group 2 women had more difficulty inhibiting thin-ideal female model stimuli, relative to the neutral home stimuli, while Group 1 women did not differ across the two conditions. This finding seems to support the notion that women with bulimic symptoms demonstrate a specific pattern of inefficient inhibition in response to the presentation of thin-depicting media information.

Alternative explanations of this effect should also be explored. One could speculate that women with bulimic symptoms demonstrated significantly greater interference across the two stimuli conditions because they were purposefully attending to, encoding, and trying to remember the information, as opposed to the hypothesis that they had more difficulty inhibiting the information. However, the at-risk women did not differ in their ability to identify task relevant thin-depicting media pictures versus neutral media pictures during the manipulation task. Nor did the at-risk women differ from control women in their ability to identify task relevant thin-depicting or neutral media pictures during the manipulation task. These results suggest the pattern of performance exemplified by women with bulimic symptoms on the modified pictorial Stroop cannot simply be attributed to the better encoding of media information by women with bulimic symptoms.

One could also speculate that women with bulimic symptoms were slower to sort thin-depicting media information secondary to a general slowing phenomenon, rather

than a failure to inhibit irrelevant media information. However, since women with bulimic symptoms were actually faster on overall card sorting times in comparison to control women, this explanation seems unlikely.

One could also consider the possibility that differences in levels of depressive symptomatology could account for the group by condition interaction observed on the modified pictorial Stroop paradigm, the group differences observed on the modified verbal Stroop paradigms, and the group differences in levels of executive functioning. The two groups did differ significantly in their self-reported levels of depressive symptoms, as indicated by scores on the BDI-II, and it is well known that depression is often associated with deficits in attention and concentration and other cognitive impairments. Depression is particularly common among individuals with bulimic symptoms, with reported rates across studies varying between 46-89% (Cooper, 1995a; Pope, et al., 1984). This presents a particular problem when examining the neuropsychological performances of women with bulimic symptoms. Because depression is often inextricably tied to the presentation of an eating disorder, it is very difficult to make definitive assertions regarding the underlying mechanisms influencing the particular cognitive performances of this group. This presents as a limitation to the present study and should be addressed further in future studies.

In general, there does seem to be a link between level of bulimic symptoms and the "interference effect" produced on the modified pictorial Stroop paradigm. The results of the present study seem to suggest that women with bulimic symptoms have more difficulty inhibiting irrelevant thin ideal female model stimuli. This particular breakdown

in inhibitory control may provide further converging evidence of inefficient suppression in this sample of women (Gernsbacher, 1990). This will be discussed in more detail in the following section.

Third, hypothesis 3 was supported, in that women “at risk” for the development of an eating disorder selectively processed eating, weight, and shape information in the same manner as women diagnosed with eating disorders (Cooper & Todd, 1997). Specifically, women in the “at-risk” group demonstrated significantly greater interference scores on eating, weight, and shape verbal Stroop paradigms, relative to a control group of women. This is consistent with the performances of clinically diagnosed anorexic and bulimic patients in the Cooper and Todd (1997) study. These findings indicate that women with bulimic symptoms demonstrate a specific pattern of inefficient inhibition in response to the presentation of information that has strong semantic associations with concerns relevant to their particular pathology. This finding provides further evidence of inhibitory dyscontrol in women at-risk for the development of an eating disorder.

Fourth, hypothesis 4 was supported, in that women with bulimic symptoms demonstrated poorer performances on a composite measure of executive functioning tests, relative to women with no or minimal bulimic symptoms. This finding is consistent with the findings of prior studies demonstrating executive functioning deficits in women diagnosed with and at-risk for bulimia (Beatty et al., 1990; Ferraro et al., 1997a; Ferraro et al., 1997b; Pendleton-Jones et al., 1991). Again, this finding provides further evidence of inhibitory dyscontrol within this subject group, given that performance decrements on executive functioning measures are often linked to problems with inhibition. However, it

error rates in response to sorting thin-depicting media stimuli. Women with no or minimal bulimic symptoms did not show this same effect.

Results of this study also indicate that women with bulimic symptoms demonstrate a specific pattern of inefficient inhibition in response to the presentation of information that has strong semantic associations with concerns relevant to their particular pathology. In addition, findings indicate these same women demonstrated poorer performances on a composite measure of executive functioning tests, relative to women with no or minimal bulimic symptoms. Overall, support for hypotheses 2, 3, and 4 provide further evidence of inhibitory dyscontrol within this subject group.

The application of the structure building framework may be useful in the explanation of why women with bulimic symptoms demonstrate inefficient inhibitory control. According to Gernsbacher (1990), the structure building framework uses the cognitive mechanisms of suppression and enhancement to explain breakdowns in inhibitory efficiency. Specifically, inhibitory inefficiencies could be resultant from either 1) the inability to activate relevant information for a particular cognitive task (defective enhancement), or 2) the inability to inhibit information that is present, but irrelevant, to a particular cognitive task (defective suppression).

Several authors have argued that cognitive inefficiencies demonstrated by particular patient populations can be attributed primarily to defective suppression, or an inability to inhibit partially active, irrelevant representations (Balota & Duchek, 1991; Duchek et al., 1995; Gernsbacher & Faust, 1991). Results of those studies found that irrelevant stimuli interfered with fast and accurate response times on picture/word

decision making tasks in some subject groups. The results of the present study parallel earlier findings, in that irrelevant stimuli (thin-depicting media stimuli) interfered with performance speed and accuracy of a card sorting Stroop task, and irrelevant stimuli (eating, weight, and shape words) interfered with performance speed and accuracy of a color naming Stroop task in a sample of women with bulimic symptoms. Using these findings, it could be argued that inefficient suppression is the mechanism by which women with bulimic symptoms fail to inhibit partially active, irrelevant representations of information pertinent to eating disorder concerns.

The notion of a breakdown in inhibitory control (impaired suppression) may also provide clues into the neuropsychological functioning of women with bulimic symptoms. The results of the present study suggest that women with bulimic symptoms show problems on specific executive functioning measures. Poor performances on neuropsychological measures of executive function are generally associated with problems with inhibiting behaviors, impulsivity, and planning (Lezak, 1995). These problems seem paramount to the neuropsychological performances of women diagnosed with and at risk for bulimia. Pendleton-Jones et al. (1991) found that normal weight bulimics showed specific impairment in the area of focusing/execution, and Beatty et al. (1990) found evidence of cognitive impulsivity and inefficient inhibition in patients diagnosed with bulimia nervosa. In addition, findings by Ferraro et al. (1997a) indicated marked impulsivity and inefficient problem solving ability among bulimic individuals, and the findings by Ferraro et al. (1997b) indicated that women at-risk for eating disorders demonstrated faulty inhibition.

It is interesting that the specific problems exhibited by women with bulimic symptoms on neuropsychological measures correspond to hallmark behavioral and personality characteristics of the disorder. It is possible that impaired suppression may also be used as a model to explain this group's striking inability to inhibit various behaviors, such as bingeing, purging, promiscuity, and substance abuse (DaCosta & Halmi, 1992; Lowe & Eldridge, 1993; Vandereycken & Pierloot, 1983; Vastag, 2001).

The structure building model may also provide an explanation as to why women with bulimic symptoms are more susceptible to the negative impact of thin-depicting media stimuli. One possible explanation is that a breakdown in inhibitory control (impaired suppression) may predispose women with bulimic symptoms to selectively attend to the "irrelevant" thin-depicting media information so ubiquitous in our culture today. The failure to inhibit this information may allow for the frequent and prolonged activation of this information in working memory (Duchek et al., 1991). Prolonged activation of this information in working memory may influence bulimic women to be more aware of thin ideal media information, and thus internalize and subscribe to sociocultural mores of thinness and attractiveness. Impaired suppression may provide a theoretical means in which women with bulimic symptoms become more vulnerable to the negative impact of thin-depicting media stimuli.

The results of the present study seem to support the application of the structure building framework as a possible way to link the characterological, neurobehavioral, and sociocultural features of women with bulimic symptomatology through a theoretical cognitive framework.

is important to note that overall the “at risk” women in this study were not impaired on any of the neuropsychological measures. In general, women in both the control group and the “at risk” group were educated, college students with above average intelligence (as indicated by performances on the Vocabulary subtest of the WAIS-III). As in previous neuropsychological studies (Pendleton-Jones et al., 1991), the absolute differences in scores between the “at risk” group and the control group were small, suggesting subtle, rather than profound neuropsychological problems. Most scores on the neuropsychological tests fell well within the normative range, as indicated by published norms. It is interesting, however, that the specific executive functioning deficits exhibited by women with bulimic symptoms correspond to many of the impulsive behaviors that present with the disorder of bulimia nervosa.

Fifth, the results did not provide support for hypothesis 5, which predicted that women reporting higher levels of eating restraint would demonstrate more difficulty on measures of visuo-spatial ability, relative to women reporting low levels of eating restraint. This finding does not appear to support the hypothesis of right hemisphere dysfunction in eating disorders previously proposed by other authors (Bowers, 1994; Fox, 1991; Thompson, 1993).

Inefficient Inhibition in Women with Bulimic Symptoms

The results of the present study indicate that women with bulimic symptoms had more difficulty inhibiting irrelevant activated information when it exemplified “thin-ideal” media stereotypes. This was evidenced by a Stroop interference effect and higher

Clinical Implications

Given the findings of the present study and those reported in previous literature, the characteristics of impulsivity and the failure to inhibit may have important clinical implications.

Differentiating normative weight concerns from more serious symptoms of eating disorders has been one of the challenges in both the clinical and research aspects of the eating disorders. It would be interesting to conduct a study examining whether the modified pictorial Stroop, along with other neuropsychological tests, may provide a means to measure or denote the intensity of eating disorder psychopathology. Although it is doubtful that any one test or small battery of tests can be used as diagnostic tools, *per se*, such a battery may have potential to serve in the identification of women at particular risk for developing an eating disorder. The inclusion of tests designed to measure levels of impulsivity and inhibitory dyscontrol may also help to identify those who may fare poorly in treatment, or be at high risk of relapse after treatment intervention.

Findings quite consistently show that highly impulsive bulimics display disappointing response of bulimic symptoms to conventional treatment (Keel & Mitchell, 1997). Interpreting such findings in light of the impulsivity and inhibitory dyscontrol described among bulimics in the literature, it is possible that impulsive bulimics may show poor response to conventional treatments because these interventions do not address a dimension that is central to the maintenance of bulimic behaviors. It may be that the treatment of the impulsive bulimic requires special components aimed at heightening abilities to anticipate and inhibit binge eating and purging. In other words,

specialized interventions that target impulsivity and inhibitory dyscontrol (and their implications upon eating behaviors) may be pertinent.

In addition, the results of this study inherently tap into the real world implications of using ultra-thin female body representations as images of ideal beauty. Perhaps it would be of benefit to add an educational, desensitization component to existing treatments currently used with eating disordered patients. An additional educational component may serve to teach certain individuals skills or strategies for effectively disregarding societal standards of thinness and beauty. This may ultimately serve to decrease these individual's levels of distress when they are confronted with the omnipresent social messages of "thin-ideal" stereotypes.

However, it is still unknown at this time whether the mechanisms of suppression and enhancement are under conscious control or whether they are automatic processes (Gernsbacher & Faust, 1991). According to Gernsbacher and Faust (1991), if suppression is not simply an automatic process, than it may be possible to provide interventions that could teach individuals how to suppress irrelevant information, and inefficient suppression could be reduced upon treatment implementation. If suppression is an automatic process, however, it would be unlikely to change even upon treatment intervention (Gernsbacher & Faust, 1991). Future studies could address whether the mechanisms of suppression and enhancement are amenable to conscious control, and findings could be used in the application of treatment interventions.

It will be important to replicate this study using clinical participants with diagnoses of anorexia nervosa and bulimia nervosa to contribute to the clinical

significance and implications of the study. It is possible that clinically diagnosed patients may show a broader range of inefficiencies consistent with inhibitory dyscontrol and impulsivity. The best way to address the identification, assessment, treatment, and prevention issues pertinent to eating disorders would be to conduct a large-scale, longitudinal study, following young women “at-risk” for the development of an eating disorder through adolescence, using neuropsychological measures, modified Stroop paradigms, and biological markers (blood levels, CT, MRI, or PET) as assessment tools. A study of that nature may help to further explain a mechanism by which inhibitory dyscontrol is mediated.

On a broader, societal level, it is important to understand the ramifications of using ultra-thin female body representations as images of ideal beauty. Given the correlational link between these images and the increased incidence of eating disorders, it may be wise to use more realistic and more representative images of female body types as standards of beauty in media publications.

APPENDICES

APPENDIX A

PILOT STUDY DIRECTIONS AND CONSENT

Hi, my name is Kristi Lokken and I am a fourth year clinical psychology graduate student conducting research on the effects of media advertisements on eating, weight, and shape concerns of college women. You have been invited to participate in a pilot study designed to gather data examining student's perceptions of certain print media advertisements, in order to select media stimuli for my dissertation project.

Directions: The study will take approximately 30 minutes and you will receive 1 hour of extra credit for your participation. You will be asked to examine and provide opinion ratings of 200 print media advertisements. Your opinions will be used to select stimuli for the project. The advertisements will appear on the projector screen, one after another. Please follow along carefully and record your answers in the proper blanks. If you feel distressed or uncomfortable at any time during the study, you may discontinue without penalty. Thank you for your participation!!

See additional pages for how to record ad opinion ratings.

I willingly agree to participate in the pilot study.

DATE _____

SIGNATURE _____

APPENDIX B

1. For the first 100 advertisements, you will be asked to make three opinion ratings.

A = Rate the model's body type (in your opinion)

Not thin at all

Very thin

0 1 2 3 4 5 6 7 8 9 10

B = Rate the model's attractiveness level (in your opinion)

Not attractive at all

Very attractive

0 1 2 3 4 5 6 7 8 9 10

C = Rate how much this picture influences you to think about eating, weight, or body shape (again, your opinion)

No influence at all

Strong influence

0 1 2 3 4 5 6 7 8 9 10

2. For the second 100 advertisements, you will be asked to make two opinion ratings.

A = Rate how interesting you find this ad (in your opinion)

Not interesting at all

Very Interesting

0 1 2 3 4 5 6 7 8 9 10

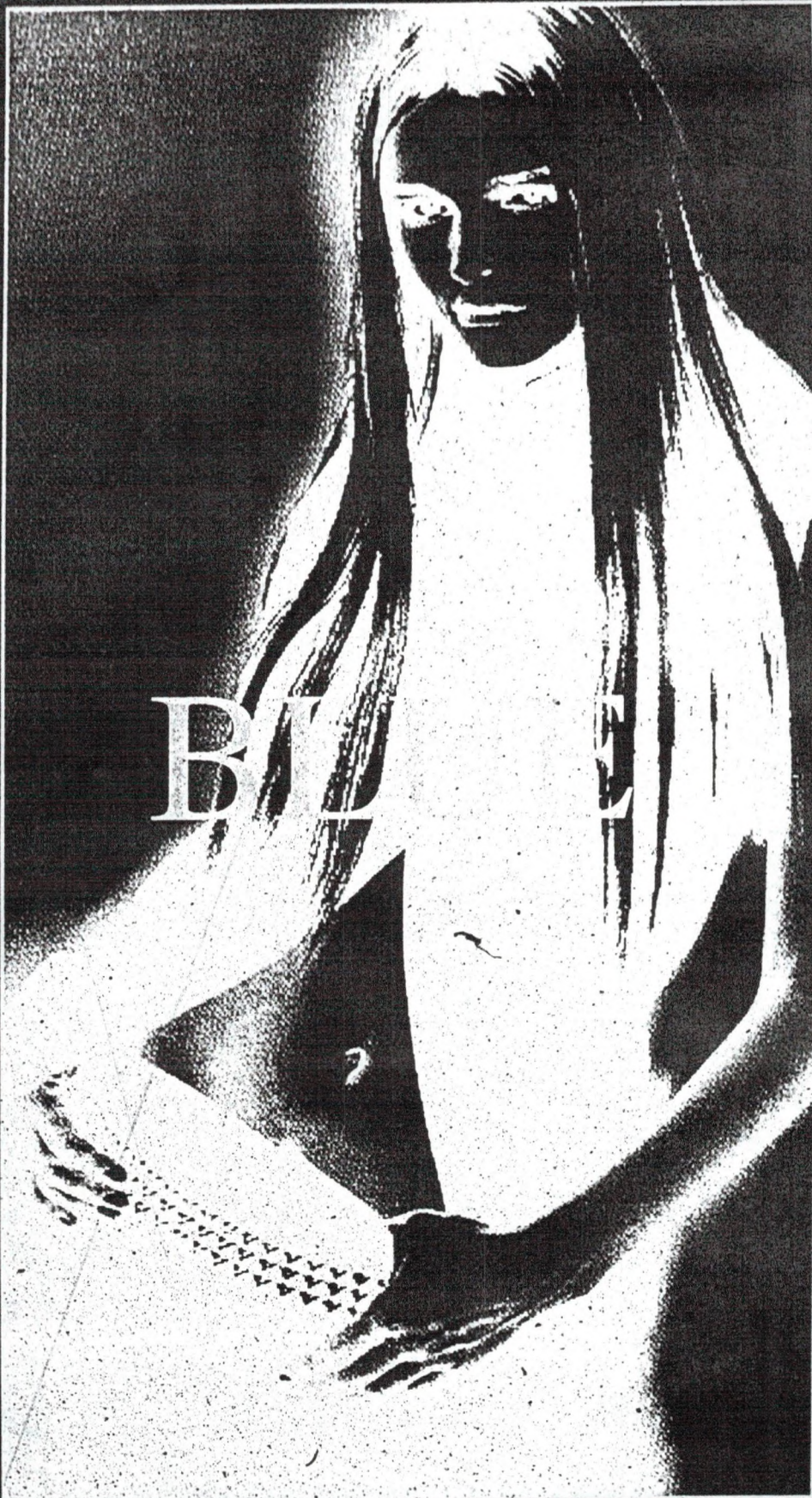
B = Rate how much this picture influences you to think about eating, weight, or body shape (again, your opinion)

No influence at all

Strong influence

0 1 2 3 4 5 6 7 8 9 10

APPENDIX C





APPENDIX E



APPENDIX F



APPENDIX G
Consent Form

Pilot Study

Hello, my name is Kristi Lokken and I am a fourth year clinical psychology graduate student conducting research on eating attitudes and behaviors of college women. You have been invited to participate in a study that will investigate the effects of thinking and behavior. You will be asked to complete three separate tasks, called Stroop tasks, that will assess your ability to process complex information rapidly. You will also be asked to fill out a series of questionnaires after you complete the three Stroop tasks. This session will last between 30 minutes and one hour and you will be given one point of extra credit for your participation. You have been assigned a private subject number and your name will not be associated with any of the tasks you participate in today or any of the questionnaires you fill out. All performances and answers on the questionnaires will be held in strict confidence.

There are no known physical risks associated with this study. However, some of the neuropsychological tasks are challenging, and some of the questions are of a sensitive and personal nature. You may experience some discomfort while completing the neuropsychological tasks or filling out the questionnaires. If you feel uncomfortable at any time during the experiment, you can take a break or you may discontinue at any time, without penalty. If you have any concerns or questions about the study, feel free to contact Kristi Lokken, M.A. at 777-4348 or Dr. Ric Ferraro at 777-2414.

For your personal information, the University Counseling Center is located in McCannel Hall, telephone number 777-2127, and the Psychological Services Center is located in Montgomery Hall, telephone number 777-3691. Both are resources available to you at no or low cost, should you feel the need to seek support or psychological services.

By participating in this study, you can contribute to the improved understanding of how different individuals perform on different Stroop paradigms. Again, in return for your participation in this study, you will receive 1 additional hour of extra credit. If you do decide to participate, you are free to discontinue participation at any time without penalty. You are encouraged to ask questions and raise concerns you may have regarding the study.

I have read all of the above and willingly agree to participate in this study.

Date _____

Signature of Participant _____
Signature of Examiner _____

APPENDIX H

Demographics and Personal History Questionnaire

Age _____

Education Level _____

Ethnicity (please choose) _____

- 1=Caucasian
- 2=American Indian
- 3=African American
- 4=Asian
- 5=Other(please describe)

Religion (please choose) _____

- 1=Catholic
- 2=Lutheran
- 3=Baptist
- 4=Jewish
- 5=Other(please describe)

Marital status (please choose) _____

- 1=Single
- 2=Married
- 3=Other(please describe)

Living situation (please choose) _____

- 1=Live alone
- 2=Live with roommate(s)
- 3=Live with family
- 4=Other (please describe)

Do you have children? _____

If yes, how many? _____

Hometown population _____

- 1=under 5,000 people
- 2=5,000-20,000 people
- 3=20,000-50,000 people
- 4=50,000-100,000 people
- 5=100,000+ people

Hometown location _____

- 1=Midwestern U.S.
- 2=Southern U.S.
- 3=Eastern U.S.
- 4=Western U.S.
- 5=Other(please describe) _____

Approximate Yearly Income _____

Supported by: ___ Family Income
___ Individual Income

- 1=under \$20,000
- 2=\$20,000-\$50,000
- 3=\$50,000-\$75,000
- 4=\$75,000-\$100,000
- 5=\$100,000+
- 6=Other or unknown(please describe)

Physical and Mental Health History Information

1. Please place an X on the scale below to indicate your current physical health rating:
 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____
 poor fair average good excellent
2. Have you ever had an injury to your head that resulted in loss of consciousness?
 Please Circle: YES NO If YES, when (what year)? _____
 How long were you unconscious? (1 minute, 1 day?) _____
 Was the injury considered serious? YES NO
3. Do you have a history of any neurological disturbance such as epilepsy, brain tumor, multiple sclerosis, stroke, etc.? Please describe. _____
4. Have you ever been diagnosed with a learning disability? _____
5. Do you have any academic difficulties? Please describe. _____
6. To your knowledge, were there any complications associated with your birth (were you premature? At low birth weight? etc.) _____
7. Have you ever experienced any psychological or psychiatric disturbance? _____

8. Have you ever been diagnosed with depression or anxiety? Please describe. _____

9. Have you ever been diagnosed with anorexia nervosa or bulimia nervosa? Please describe. _____

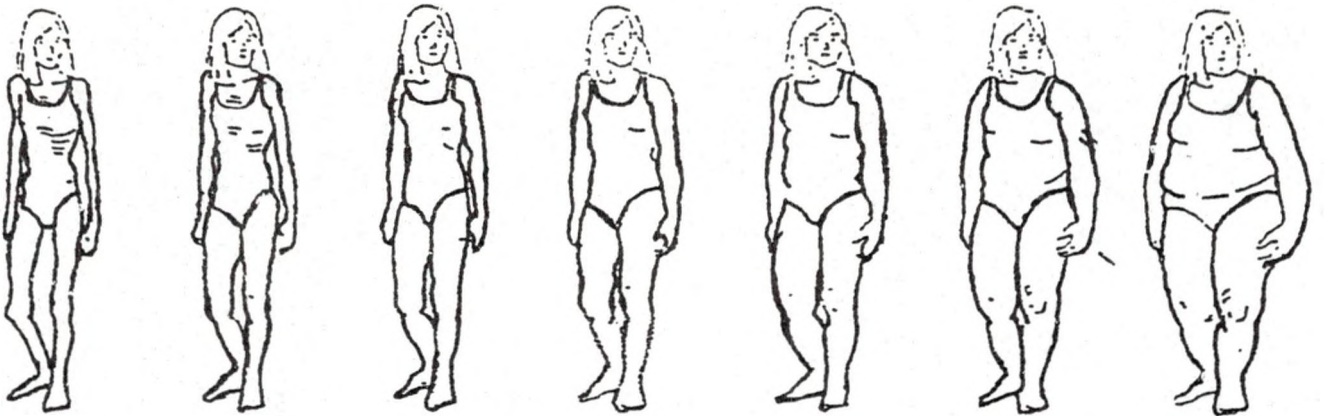
10. Have you ever seen a psychiatrist or psychologist for any reason? Please describe. _____

11. Are you now, or have you ever in the past been prescribed or taken any psychotropic medication, including medication for anxiety or depression? Please describe. _____

12. Do you, or have you in the past, had a problem with abusing alcohol or drugs? Please describe. _____
 Approximately how often do you drink alcohol? _____
 When you drink, approximately how much do you drink? _____
13. Are you currently taking oral contraceptives (birth control pills) or using any other type of hormonal birth control (such as Norplant or Depo Provera)? _____

Personal History Information

1. Current Weight (in pounds) _____
 Current Height (in feet and inches) _____
 Estimated Body Frame (please circle) Small Medium Large
2. I feel I am currently (please choose) _____
 1=very underweight
 2=slightly underweight
 3=at an average weight
 4=slightly overweight
 5=very overweight
3. My "ideal" weight is (in pounds) _____
4. Using the seven body silhouettes below, CIRCLE the one that is most similar to your CURRENT body type. (the one you think your body looks like now)



5. Using the seven body silhouettes above, MARK AN "X" over the one that is most similar to your IDEAL body type. (the one you would prefer your body to look like)

Please circle either Yes or No depending on your opinion.

1. In general, most fat people have little will power. YES NO
2. Eating too much and lack of exercise cause obesity. YES NO
3. People are responsible for their weight. YES NO
4. Weight differences in people mostly reflect differences in natural set points weights.
 YES NO

5. It is unhealthy to be overweight. YES NO
6. People who are overweight should carefully select clothing that conceals their body.
YES NO
7. Thin women are generally more reliable in employment situations. YES NO
8. Most overweight women have a lot of emotional problems. YES NO
9. In many situations, obesity should constitute a medical basis for denial of employment. YES NO
10. Because obese people are discriminated against, it could be said that obesity causes poverty. YES NO

-
1. Roughly estimate the amount of time (in hours and minutes) that you were exposed to the following media sources over the **past 24 hours**:

Newspapers _____ hours _____ minutes
 Magazines _____ hours _____ minutes
 Movies _____ hours _____ minutes
 Radio _____ hours _____ minutes
 Television _____ hours _____ minutes

2. Roughly estimate the amount of time (in hours and minutes) that you were exposed to the following media sources over the **past two weeks**:

Newspapers _____ hours _____ minutes
 Magazines _____ hours _____ minutes
 Movies _____ hours _____ minutes
 Radio _____ hours _____ minutes
 Television _____ hours _____ minutes

3. Please list the last three movies you have seen:

4. Please list your three favorite (or most watched) TV shows:

5. Please rate the following magazine types from 1 to 5, **1 being most interesting to you** and **5 being least interesting to you**.

___ Beauty and Fashion (Cosmopolitan, Glamour, Elle)

___ Entertainment and Gossip (People, TV Guide, Enquirer)

___ Health and Fitness (Shape, Prevention, Health)

___ Home and Gardening (Martha Stuart, Better Homes, McCalls)

___ News and Current Events (Time, Newsweek, Life)

APPENDIX I

BDI-II

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. **Be sure that you do not choose more than one statement for any group**, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

5. Guilty Feelings

- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

2. Pessimism

- 0 I am not discouraged about the future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

6. Punishment Feelings

- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

3. Past Failures

- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

7. Self-Dislike

- 0 I feel the same about myself as ever
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

4. Loss of Pleasure

- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

8. Self-Criticalness

- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all my faults.
- 3 I blame myself for everything bad that happens to me.

9. Suicidal Thoughts or Wishes

- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying

- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

11. Agitation

- 0 I am no more restless or wound up than usual.
- 1 I feel more restless or wound up than usual.
- 2 I am so restless or agitated that it's hard to stay still.
- 3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0 I have not lost interest in other people or activities.
- 1 I am less interested in other people or things than before.
- 2 I have lost most of my interest in other people or things.
- 3 It's hard to get interested in anything.

13. Indecisiveness

- 0 I make decisions about as well as ever.
- 1 I find it more difficult to make decisions than usual.
- 2 I have much greater difficulty in making decisions than I used to.
- 3 I have trouble making any decisions.

14. Worthlessness

- 0 I do not feel I am worthless.
- 1 I don't consider myself as worthwhile and useful as I used to.
- 2 I feel more worthless as compared to other people.
- 3 I feel utterly worthless.

15. Loss of Energy

- 0 I have as much energy as ever.
- 1 I have less energy than I used to have.
- 2 I don't have enough energy to do very much.
- 3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0 I have not experienced any change in my sleeping pattern.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0 I am no more irritable than usual.
- 1 I am more irritable than usual.
- 2 I am much more irritable than usual.
- 3 I am irritable all of the time.

18. Change in Appetite

- 0 I have not experienced any changes in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than before.
- 3a I have no appetite at all.
- 3b I crave food all the time.

19. Concentration Difficulty

- 0 I can concentrate as well as ever.
- 1 I can't concentrate as well as usual.
- 2 It's hard to keep my mind on anything for very long.
- 3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

- 0 I am no more tired or fatigued than usual.
- 1 I get more tired or fatigued more easily than usual.
- 2 I am too tired or fatigued to do a lot of the things I used to do.
- 3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than before.
- 2 I am much less interested in sex now

APPENDIX J

The BULIT-R

Answer each question by circling the appropriate number. Please respond to each item as honestly as possible; remember all of the information you provide will be kept strictly confidential.

1. I am satisfied with my eating patterns.
 1. agree
 2. neutral
 3. disagree a little
 4. disagree
 5. disagree strongly

2. Would you presently call yourself a "binge eater"?
 1. yes, absolutely
 2. yes
 3. yes, probably
 4. yes, possibly
 5. no, probably not

3. Do you feel you have control over the amount of food you consume?
 1. most or all the time
 2. a lot of the time
 3. occasionally
 4. rarely
 5. never

4. I am satisfied with the shape and size of my body.
 1. frequently or always
 2. sometimes
 3. occasionally
 4. rarely
 5. seldom or never

5. When I feel that my eating behavior is out of control, I try to take rather extreme measures to get back on course (strict dieting, fasting, laxatives, diuretics, self-induced vomiting, or vigorous exercise).
 1. always
 2. almost always
 3. frequently
 4. sometimes
 5. never or my eating behavior is never out of control

6. I use laxatives or suppositories to help control my weight.
 1. once a day or more
 2. 3-6 times a week
 3. once or twice a week
 4. 2-3 times a month
 5. once a month or less (or never)

7. I am obsessed about the size and shape of my body.

1. always
2. almost always
3. frequently
4. sometimes
5. seldom or never

8. There are times when I rapidly eat a very large amount of food.

1. more than twice a week
2. twice a week
3. once a week
4. 2-3 times a month
5. once a month or less (or never)

9. How long have you been binge eating (eating uncontrollably to a point of stuffing yourself)?

1. not applicable; I don't binge eat
2. less than 3 months
3. 3 months-1 year
4. 1-3 years
5. 3 or more years

10. Most people I know would be amazed if they knew how much food I can consume at one sitting.

1. without a doubt
2. very probably
3. probably
4. possibly
5. no

11. I exercise in order to burn calories.

1. more than 2 hours per day
2. about 2 hours per day
3. more than 1 but less than 2 hours per day
4. one hour or less per day
5. I exercise but not to burn calories or I don't exercise

12. Compared with women your age, how preoccupied are you about your weight and body shape?

1. a great deal more than average
2. much more than average
3. more than average
4. a little more than average
5. average or less than average

13. I am afraid to eat anything for fear that I won't be able to stop.

1. always
2. almost always
3. frequently
4. sometimes
5. seldom or never

14. I feel tormented by the idea that I am fat or might gain weight.

1. always
2. almost always
3. frequently
4. sometimes
5. seldom or never

15. How often do you intentionally vomit after eating?

1. 2 or more times a week
2. once a week
3. 2-3 times a month
4. once a month
5. less than once a month or never

16. I eat a lot of food when I'm not even hungry.

1. very frequently
2. frequently
3. occasionally
4. sometimes
5. seldom or never

17. My eating patterns are different from the eating patterns of most people.

1. always
2. almost always
3. frequently
4. sometimes
5. seldom or never

18. After I binge eat I turn to one of several strict methods to try to keep from gaining weight (vigorous exercise, strict dieting, fasting, self-induced vomiting, laxative, or diuretics).

1. never or I don't binge eat
2. rarely
3. occasionally
4. a lot of the time
5. most all of the time

19. I have tried to lose weight by fasting or going on strict diets.

1. not in the past year
2. once in the past year
3. 2-3 times in the past year
4. 4-5 times in the past year
5. more than 5 times in the past year.

20. I exercise vigorously and for long periods of time in order to burn calories.

1. average or less than average
2. a little more than average
3. more than average
4. much more than average
5. a great deal more than average

21. When engaged in an eating binge, I tend to eat foods that are high in carbohydrate (sweets and starches).

1. always
2. almost always
3. frequently
4. sometimes
5. seldom, or I don't binge

22. Compared to most people, my ability to control my eating behavior seems to be:

1. greater than others' ability
2. about the same
3. less
4. much less
5. I have absolutely no control

23. I would presently label myself a 'compulsive eater', (one who engages in episodes of uncontrolled eating).

1. absolutely
2. yes
3. yes, probably
4. yes, possibly
5. no, probably not

24. I hate the way my body looks after I eat too much.

1. seldom or never
2. sometimes
3. frequently
4. almost always
5. always

25. When I am trying to keep from gaining weight, I feel that I have to resort to vigorous exercise, strict dieting, fasting, self-induced vomiting, laxatives, or diuretics.

1. never
2. rarely
3. occasionally
4. a lot of the time
5. most or all of the time

26. Do you believe that it is easier for you to vomit than it is for most people?

1. yes, it's no problem at all for me
2. yes, it's easier
3. yes, it's a little easier
4. about the same
5. no, it's less easy

27. I use diuretics (water pills) to help control my weight.

1. never
2. seldom
3. sometimes
4. frequently
5. very frequently

28. I feel that food controls my life.

1. always
2. almost always
3. frequently
4. sometimes
5. seldom or never

29. I try to control my weight by eating little or no food for a day or longer

1. never
2. seldom
3. sometimes
4. frequently
5. very frequently

30. When consuming a large quantity of food, at what rate of speed do you usually eat?

1. more rapidly than most people have ever eaten in their lives
2. a lot more rapidly than most people
3. a little more rapidly than most people
4. about the same rate as most people
5. more slowly than most people (or not applicable)

31. I use laxatives or suppositories to help control my weight.

1. never
2. seldom
3. sometimes
4. frequently
5. very frequently

32. Right after I binge eat I feel:

1. so fat and bloated I can't stand it
2. extremely fat
3. fat
4. a little fat
5. OK about how my body looks or I never binge eat

33. Compared to other people of my sex, my ability to always feel in control of how much I eat is:

1. about the same or greater
2. a little less
3. less
4. much less
5. a great deal less

34. In the last 3 months, on the average how often did you binge eat (eat uncontrollably to the point of stuffing yourself)?

1. once a month or less (or never)
2. 2-3 times a month
3. once a week
4. twice a week
5. more than twice a week

35. Most people I know would be surprised at how fat I look after I eat a lot of food.

1. yes, definitely
2. yes
3. yes, probably
4. yes, possibly
5. no, probably not or I never eat a lot of food

36. I use diuretics (water pills) to help control my weight.

1. 3 times a week or more
2. once or twice a week
3. 2-3 times a month
4. once a month
5. never

APPENDIX K

RRS

Please read each of the following questions and circle the number the best reflects your agreement with the statement.

1. How often are you dieting?
 0. Never
 1. Rarely
 2. Sometimes
 3. Often
 4. Always

2. What is the maximum amount of weight (in pounds) that you have ever lost within one month?
 0. 0-4
 1. 5-9
 2. 10-14
 3. 15-19
 4. 20 or more

3. What is the maximum weight gain within one week?
 0. 0-1
 1. 1-2
 2. 2.1-3
 3. 3.1-5
 4. 5.1 or more

4. In a typical week, how much does your weight fluctuate?
 0. 0-1
 1. 1.1-2
 2. 2.1-3
 3. 3.1-5
 4. 5.1 or more

5. Would a weight fluctuation of 5 pounds affect the way you live your life?
 0. Not at all
 1. Slightly
 2. Moderately
 3. Very much

6. Do you eat sensibly in front of others and splurge alone?
 0. Never
 1. Rarely
 2. Often
 3. Always

7. Do you give too much time and thought to food?
 0. Never
 1. Rarely
 2. Often
 3. Always

8. Do you have feelings of guilt after overeating?
- 0 Never
 - 1 Rarely
 - 2 Often
 - 3 Always
9. How conscious are you of what you are eating?
- 0 Not at all
 - 1 Slightly
 - 2 Moderately
 - 3 Extremely
10. How many pounds over your desired weight were you at your maximum weight?
- 0 0-1
 - 1 1-5
 - 2 6-10
 - 3 11-20
 - 4 21 or more

APPENDIX L

SATAQ

Please read each of the following items and circle the number that best reflects your agreement with the statement.

1. Women who appear in TV shows and movies project the type of appearance that I see as my goal.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

2. I believe that clothes look better on thin models.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

3. Music videos that show thin women make me wish that I were thin.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

4. I do not wish to look like the models in the magazines.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

5. I tend to compare my body to people in magazines and on TV.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

6. In our society, fat people are not regarded as unattractive.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

7. Photographs of thin women make me wish that I were thin.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

8. Attractiveness is very important if you want to get ahead in our culture.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

9. It's important for people to work hard on their figures/physiques if they want to succeed in today's culture.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

10. Most people do not believe that the thinner you are, the better you look.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

11. People think that the thinner you are, the better you look in clothes.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

12. In today's society, it's not important to always look attractive.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

13. I wish I looked like a swimsuit model.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 5. completely agree

14. I often read magazines like Cosmopolitan, Vogue, and Glamour and compare my appearance to the models.
 1. completely disagree
 2. disagree
 3. neither
 4. agree
 6. completely agree

APPENDIX M

LFAIS

Please read over each item and circle the number that best applies.

1. Women should be considered as seriously as men as candidates for the Presidency of the United States.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

2. Although women can be good leaders men make better leaders.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

3. A woman should have the same job opportunities as a man.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

4. Men should respect women more than they currently do.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

5. Many women in the work force are taking jobs away from men who need the jobs more.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

6. Doctors need to take women's health concerns more seriously.

1	2	3	4	5	6
Strongly Disagree				Strongly Agree	

APPENDIX N

Consent Form
FEMALES ONLY

Directions: This packet of questionnaires contains a series of personal questions that are designed to gather information for a research project. These questionnaires are completely confidential and **only** the primary investigator, a fourth year clinical psychology graduate student, will see your individual answers. A private subject number is listed at the top of each of the questionnaires in your packet. Please make sure this number is the same on all of the questionnaires and that this number corresponds to the subject number on the manila envelope. This number has been assigned to you to ensure that your name **will not** be associated with your answers. Please make sure your name and telephone number are printed on the manila envelope so you can be contacted to participate in Phase II of this research project. When you are finished completing the packet of questionnaires, please place the packet in the manila envelope provided and hand it to the research assistant. You will be given one point of extra credit for participating in this screening session.

If you feel uncomfortable answering any of the questions, you may leave those questions blank. However, please make an attempt to answer every question. There will be no repercussions for any of your answers and your answers will in no way harm you or affect your grade. In addition, you may discontinue answering these questions at any time, without penalty. If you have any concerns or questions about the study, feel free to contact Kristi Lokken, M.A. at 777-4348 or Dr. Ric Ferraro at 777-2414. In addition, the University Counseling Center is located in McCannel Hall, telephone number 777-2127, and the Psychological Services Center is located in Montgomery Hall, telephone number 777-3691. Both are resources available to you at no or low cost, should you feel the need to seek support or psychological services.

It is possible that you will be contacted in the future by a research assistant asking you to participate in Phase II of this research project. This individual will not know how you answered these questions. You will be offered an additional 3 points of extra credit should you choose to participate in Phase II of the study.

There are **no right or wrong answers** to the questions in this packet, please answer as **honestly** as possible. Remember, your answers will be kept **confidential**. Please read each set of directions carefully before completing the questionnaires. Thank you for your participation!!

I have read all of the above and willingly agree to participate in this screening session.

Date _____

Signature of Participant _____

APPENDIX O

Consent Form 2

Hi, my name is Kristi Lokken and I am a fourth year clinical psychology graduate student conducting research on eating attitudes and behaviors of college women. You have been invited to participate in a study that will investigate the effects of thinking and behavior. You will be asked to complete several neuropsychological tasks in order to assess things like verbal abilities, attention, visual abilities, and processing skills. This session will last between 90 minutes to 2 hours. You have been assigned a private subject number and your name will not be associated with any of the tasks you participate in today. All performances will be held in strict confidence.

There are no known physical risks associated with this study. However, some of the neuropsychological tasks are challenging, and you may experience some discomfort while completing the neuropsychological tasks. If you feel uncomfortable during the testing, you can take a break or you may discontinue at any time, without penalty. If you have any concerns or questions about the study, feel free to contact Kristi Lokken, M.A. at 777-4348 or Dr. Ric Ferraro at 777-2414.

At the end of the testing session, the examiner will ask you to participate in a brief (10-15 minute) interview. Some of the questions asked during the interview may be sensitive in nature. Try to answer all of the examiner's questions honestly and to the best of your ability. However, if you begin to feel uncomfortable with answering the questions, please inform the examiner, and the interview will be discontinued. For scoring purposes, the interview will be audio-taped. Your name will not be associated with the audio-tape, and it will be held in strict confidence.

For your personal information, the University Counseling Center is located in McCannel Hall, telephone number 777-2127, and the Psychological Services Center is located in Montgomery Hall, telephone number 777-3691. Both are resources available to you at no or low cost, should you feel the need to seek support or psychological services.

By participating in this study, you can contribute to the improved understanding of how different individuals perform on different neuropsychological tests. In return for your participation in this study, you will receive 3 additional hours of extra credit. If you do decide to participate, you are free to discontinue participation at any time without penalty. You are encouraged to ask questions and raise concerns you may have regarding the study.

I have read all of the above information and willingly agree to participate in this study. I also agree to have the interview at the end of the session audio taped.

Date _____

Signature of Participant _____
Signature of Examiner _____

APPENDIX P

DEBRIEFING PROTOCOL (Group 1)

K. Lokken Dissertation

Thank you for participating in the experiment. The study you participated in focuses on examining whether or not cognitive performance (as measured by the neuropsychological tasks you just completed) is affected by being at risk for an eating disorder. If you recall, a few weeks ago you completed a series of questionnaires asking you about your attitudes towards eating, weight, and body shape. The screening questionnaires that you completed can help identify people who may be at risk for the development of an eating disorder, and those who have no or minimal eating disorder risk factors. Of course, it is very possible that the questionnaires might lead to "false positives" or "false negatives", so the information gathered from the questionnaires is tentative.

Your pattern of scores on the screening questionnaires revealed that you have very healthy attitudes about eating, your weight, and your shape. Your responses were similar to women who are not at risk for developing an eating disorder. However, as mentioned previously, the questionnaires may not be powerful enough to detect some forms of eating disorders. In addition, sometimes it is difficult to answer questions about eating, weight, and shape. If you feel you may have some risk factors for developing an eating disorder, there are several area treatment facilities listed below for your reference. Eating disorders are preventable and treatable conditions. If you believe that you may have symptoms of an eating disorder or that you may be at risk for developing one, please feel free to contact any or all of these facilities to discuss any concerns you may have with appropriate healthcare professionals. **The UND Counseling Center provides free treatment for students enrolled at UND. The UND Psychological Services Center and the Village Family Services Center provide services on a sliding scale depending on your income level. You (or your 3rd party payer) will be responsible for all expenses incurred for these services.** Again, thank you for participating. If you have any additional questions or comments, please contact Kristi Lokken, M.A. (Room 113 Corwin Larimore, 777-4348) or Dr. Ric Ferraro (303 Corwin Larimore, 777-2414).

Fargo Clinic Eating Disorders Program	1-800-437-4010
UND Counseling Center	777-2127
UND Psychological Services Center	777-3691
Altru Hospital Eating Disorders Program (Grand Forks)	780-5950
The Village Family Services Center (Grand Forks)	746-4584

APPENDIX Q

DEBRIEFING PROTOCOL (Group 2)

K. Lokken Dissertation

Thank you for participating in the experiment. The study you participated in focuses on examining whether or not cognitive performance (as measured by the neuropsychological tasks you just completed) is affected by being at - risk for an eating disorder. If you recall, a few weeks ago you completed a series of questionnaires asking you about your attitudes towards eating, weight, and body shape. Although the instruments used in that screening protocol are in no way diagnostic of any eating disorder, the results of the questionnaires can provide clues as to whether or not a person reveals a pattern of answering questions that could be indicative of an underlying eating disorder. That is, the screening questionnaire may indeed identify some people who are at risk for the development of an eating disorder. Likewise, it is very possible that the questionnaires might lead to "false positives", so this information only leads to tentative conclusions.

However, your pattern of scores was similar to that of women who have risk factors for the development of an eating disorder. Eating disorders are preventable and treatable conditions and several treatment facilities exist in the region. Some are listed below for your reference. If you believe that you may have symptoms of an eating disorder or that you may be at risk for developing one, please feel free to contact any or all of these facilities to discuss any concerns you may have with appropriate healthcare professionals. **The UND Counseling Center provides free treatment for students enrolled at UND. The UND Psychological Services Center and the Village Family Services Center provide services on a sliding scale depending on your income level. You (or your 3rd party payer) will be responsible for all expenses incurred for these services.** Again, thank you for participating. If you have any additional questions or comments, please contact Kristi Lokken, M.A. (Room 113 Corwin Larimore, 777-4348) or Dr. Ric Ferraro (303 Corwin Larimore, 777-2414).

Fargo Clinic Eating Disorders Program	1-800-437-4010
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UND Psychological Services Center	777-3691
Altru Hospital Eating Disorders Program (Grand Forks)	780-5950
The Village Family Services Center (Grand Forks)	746-4584

APPENDIX R

The Eating Disorder Examination

“Now, I am going to ask you some questions about your eating and dieting habits. This interview generally takes about 15-20 minutes, but sometimes it takes longer. I will be audio-taping our interview for scoring purposes. Again, your name will not be associated with the audio-tape, it will be held in strict confidence. Also, if at any time you feel you do not want to continue with the interview, just let me know and we will stop. Do I have your permission to be audio-taped?”

Upon the subject's consent, begin the audio-tape and continue with the structured interview.

On questions 1 and 2, just write verbatim what the subject offers. If they just say yes or no, just record that, no need to probe. If they offer more, write it down verbatim.

1. To begin with, I would like to get a general picture of your eating habits over the last 4 weeks. Have your eating habits varied much from day to day?

Over the past 4 weeks, have your eating habits on weekdays differed from those on weekends?

Over the past 4 weeks, have there been any days when you haven't eaten anything?

2. How about over the past 3 months, have your eating habits varied much from day to day?

Over the past 3 months, have your eating habits on weekdays differed from those on weekends?

And over the past 3 months, have there been days when you haven't eaten anything?

For question 3, ask about weekdays and weekends separately.

3. *Now I am going to ask you about your pattern of eating. Using this scale from 0 to 6, 0 being never and 6 being everyday, on the (weekdays/weekends), how often do you eat.....*

	<i>Weekday</i>	<i>Weekend</i>
<i>Breakfast?</i>	_____	_____
<i>A mid-morning snack?</i>	_____	_____
<i>Lunch (mid-day meal)?</i>	_____	_____
<i>A mid-afternoon snack?</i>	_____	_____
<i>An evening meal?</i>	_____	_____
<i>An evening snack?</i>	_____	_____
<i>A nocturnal (after bed) snack?</i>	_____	_____

*Note: meals and snacks should be rated even if they lead to a binge.
Rate "8" if meals or snacks are difficult to classify (i.e. shift work, etc.)*

4. *Using the same scale, with 0 begin never and 6 being every day, over the past 4 weeks, have you been consciously trying to restrict what you eat, whether or not you have succeeded? _____ If subject rates 2 or lower go to question 5.*

If subject rates 3 or higher, ask:

"Has this been to influence your shape or weight?" Y N Unsure

Note: if subject is unsure, ask: "Did the restrictions of food consist of planned attempts at restriction, or were they mostly spur-of-the-moment attempts, such as the decision to resist a second helping?"

5. *Over the past 4 weeks have you gone for periods of 8 or more waking hours without eating anything? For example, have you gone from 8am to 4pm or Noon to 8pm without any food. Again, use the same scale, and estimate everyday, more than ½ the days, less than ½ the days, or never? _____ If subject rates 2 or lower go on to question 6.*

Note: soup and milkshakes count as food, whereas drinks generally do not.

If subject rates 3 or higher ask:

"Was the restriction mostly self-imposed, or was it generally due to force of circumstances (i.e. tight schedule, etc.)?"

"When you go without food for long periods of time, is it primarily to influence your shape or weight?" Y N Sometimes Unsure

6. Using the rating scale, over the past 4 weeks have you wanted your stomach to be empty? _____ If subject rates 0 or 1 go to question 7.

Has this been to influence your shape or weight? Y N Unsure

7. Using the rating scale, over the past 4 weeks, have you tried to avoid eating any foods that you like, whether or not you have succeeded? _____ If subject rates 2 or lower go to question 8.

Note: Drinks do not count as food.

If subject rates 3 or higher ask:

"Have you tried to restrict or avoid these foods altogether, or just limit their consumption?"

"When you restrict these foods, is it primarily to influence your shape or weight?"
Y N Unsure

8. Using the rating scale, indicate how many times over the past 4 weeks you have tried to follow certain definite rules regarding your eating? For example, a calorie limit, preset quantities of food, or rules about what you should eat or when you should eat? _____ If the subject rates 0 or 1 go to question 9.

If the subject rates 2 or higher ask:

"Have there been occasions when you have been aware that you have broken a dietary rule that you have set for yourself?" Y N Unsure

If the subject answers yes, ask:

"How have you felt about breaking them?"

If the subject answers no or unsure, ask:

"How would have you felt if you had broken one of your dietary rules?"

"Can you give me some examples of these dietary rules?"

"Why have you tried to follow them?"

"Have they been designed to influence your shape or weight?"

"Have they been definite rules or general principles? For example, a definite rule is "I must not eat cake," whereas you could have the general principle, "I should try to eat healthy food."

Note: the rules should be self-imposed, although they may have originally been prescribed. Some examples may be: a certain calorie limit (1,200 calories), not eating before or after a certain time of day, not eating certain types of food, or not eating at all.

9. Over the past 4 weeks have you spent much time between meals thinking about food, eating, or calories? Y N Some Unsure If subject says "no" go on to question 10.

If subject says "yes", "some" or "unsure", ask:

Using the rating card, how often has thinking about food, eating or calories interfered with your ability to concentrate? _____ If subject rates 0 or 1 go to question 10.

Does thinking about food, eating, or calories ever interfere with you concentrating on things you are interested in, for example reading, watching TV, or following a conversation? Y N Some Unsure

10. Using the rating card, please indicate how often, over the past 4 weeks, have you been afraid of losing control over eating? _____

Note: loss of control involves a sense that one will not be able to resist or stop eating. If unable to answer, Rate "9".

11. I would like to ask you about any episodes of overeating that you may have had over the past 4 weeks. Can you recall any time in the past 4 weeks where you have engaged in excessive overeating? Y N If subject answers "no" go on to question 12.

If subject answers "yes", ask:

Now, different people mean different things by overeating, so I would like you to describe a little more about the times when you have felt that you have eaten too much in one go. During these times, would others agree you have eaten too much?

Y N Unsure

Typically what have you eaten at these times?

What were others eating at the time?

Did you have a sense of loss of control at the time? Y N *If subject answers "no", go on to question 12.*

If subject answers "yes" ask the following questions:
Could you stop eating once you started?

What could you have done to prevent the episode?

Has this pattern of overeating/loss of control been about the same over the past 2 months?

Y N

Has this pattern of overeating/loss of control been about the same over the past 3 months?

Y N

Outside these times when you have lost control over eating, how much have you been restricting the amount that you eat?

Typically what do you eat?

Have you restricted your eating to influence your shape or weight?

Note: Rate the average degree of dietary restriction. This should have been somewhat intended to influence shape, weight, or body composition.

0 – No extreme restriction outside objective bulimic episodes

1 – Extreme restriction outside of objective bulimic episodes (low energy intake due to infrequent eating and/or consumption of only low calorie foods)

2 – No eating outside objective bulimic episodes (i.e. fasting)

If rated 1 or 2, ask:

Has this pattern of restricting been about the same over the past 2 months?

Y N

Has this pattern of restricting been about the same over the past 3 months?

Y N

- 12. Back to using the rating scale, rate the degree of concern you have about others seeing you eat. For example, 0 being no concern and 6 being extreme concern.**

_____ *If subject rates 0 or 1 go on to question 13.*

If subject rates 2 or higher, ask:

Have you ever avoided events or occasions because you were concerned you would have to eat in front of others? Y N

- 13. Using the rating scale, over the past 4 weeks, have you eaten in secret or engaged in "sneak eating"?** _____

- 14. Using the rating scale, over the past 4 weeks, have you felt guilty after eating?**

_____ *If subject rates 0 or 1 go on to question 15.*

At these times, have you felt that you have done something wrong after eating?

Y N If subject says "no" go on to question 15.

If subject says "yes", ask:

Why?

If you had to assign a percentage to the times where you have felt guilty about eating, what would it be? For example, 100%, 80%, 50%, 0%, etc.?

- 15. Over the past 4 weeks have you made yourself throw-up as a means of controlling your shape or weight?** *Y N If subject answers "no", go on to question 16.*

If subject answers "yes", ask:

How many days in the past 4 weeks have you engaged in one or more episodes of self induced vomiting? _____

Can you estimate how many times you have engaged in self induced vomiting over the past 4 weeks? _____

Has this pattern of self-induced vomiting been about the same over the past 2 months?

Y N

Has this pattern of self-induced vomiting been about the same over the past 3 months?

Y N

16. *Over the past 4 weeks have you taken laxatives/diuretics as a means of controlling your shape or weight?* Y N *If subject answers "no" go on to question .*

If subject answers "yes", ask:

About how many days have you taken laxatives/diuretics over the past 4 weeks? _____

Did you ever take laxatives/diuretics more than one time on those days? Y N

If yes, ask: About how many times a day on average? _____

About how many laxatives/diuretics do you take on each occasion?

Has this pattern of laxative/diuretic use been about the same over the past 2 months?

Y N

Has this pattern of laxative/diuretic use been about the same over the past 3 months?

Y N

17. *Using the rating scale, over the past 4 weeks about how often have you exercised as a means of controlling your weight, altering your shape or amount of body fat, or burning calories?* _____ *If subject rates 0, 1, or says they exercise only for health reasons go to question 18.*

Typically, what form of exercise have you taken?

Would you describe your exercising as intense?

About how many minutes per day do you spend exercising?

Has this pattern of exercise been about the same for you over the past 2 months?

Y N

Has this pattern of exercise been about the same for you over the past 3 months?

Y N

18. *Using the rating scale, indicate how about how often over the past 4 weeks, you have been dissatisfied with your weight?* _____ *If subject rates 2 or below go on to question 19.*

If subject rates 3 or higher, ask:

Using the rating scale, indicate how often you have been so dissatisfied with your weight that it has made you unhappy. _____

19. Using the rating scale, over the past 4 weeks have you wanted to lose weight?
_____ If subject rates 2 or below go on to question 20.

If subject rates 3 or above, ask:

Do you have a strong desire to lose weight? Y N

How upsetting is it for you to weigh yourself? Slightly Moderately Extremely

20. Using the rating scale, indicate how often over the past 4 weeks you have been dissatisfied with your shape. _____ If subject rates 2 or below go on to question 21.

If subject rates 3 or higher, ask:

Using the rating scale, indicate how often you have been so dissatisfied with your shape that it has made you unhappy. _____

Over the past 4 weeks have you spent much time between meals thinking about your shape or weight? Y N Some Unsure If subject says "no" go on to question 21.

If subject says "yes", "some" or "unsure", ask:

Using the rating card, how often has thinking about your weight or shape interfered with your ability to concentrate? _____ If subject rates 0 or 1 go to question 21.

Does thinking about your weight or shape ever interfere with you concentrating on things you are interested in, for example reading, watching TV, or following a conversation? Y N Some Unsure

For question 21 ask about shape and weight separately. Circle the shape answer, X the weight answer.

21. Over the past 4 weeks, how important has your shape/weight been in influencing how you feel about or evaluate yourself as a person?

Not important at all Somewhat important Moderately important
Extremely important All important (nothing else is more important)

Over the past 2 months, how important has your shape/weight been in influencing how you feel about or evaluate yourself as a person?

Not important at all Somewhat important Moderately important
Extremely important All important (nothing else is more important)

Over the past 3 months, how important has your shape/weight been in influencing how you feel about or evaluate yourself as a person?

Not important at all Somewhat important Moderately important
Extremely important All important (nothing else is more important)

22. *If over the past 4 weeks, your weight had changed in any way, would this affect how you feel about yourself? Y N Unsure*

Is it important to you that your weight not change (i.e. that you do not gain weight)?
Y N Unsure

23. *Over the past 4 weeks have you been afraid that you might gain weight or become fat? Y N Unsure*

24. *Do you ever feel uncomfortable seeing your body, for example in the mirror, in shop window reflections, while undressing, or while taking a bath or shower?*
Y N If subject answers "no" go on to question 25.

If subject answers "yes", ask:

Have you avoided seeing your body? Y N

If subject answers "yes", ask:

Why?

25. *Have you felt uncomfortable about others seeing your body? For example, in changing rooms, with your partner, when wearing swimming suits, or when wearing clothes that show your shape? Y N*

Have you ever avoided any of these situations where others may see your body?
Y N

26. *Using the rating scale, over the past 4 weeks, how often have you felt fat? _____*

27. *Using the rating scale, over the past 4 weeks how often have you had a definite desire to have a flat stomach? _____*

28. *Over the past 3 months have you been trying to lose weight? Y N*

Over the past 3 months, have you been trying to make sure that you do not gain weight? Y N

29. *Have you ever missed any menstrual periods, not due to pregnancy?*

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