

COMORBIDITY OF OBSESSIVE-COMPULSIVE AND ANOREXIC BEHAVIORS  
IN UNDERGRADUATE FEMALES

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COMORBIDITY OF OBSESSIVE-COMPULSIVE AND ANOREXIC BEHAVIORS  
IN UNDERGRADUATE FEMALES

Amanda Margaret Marie Mulfinger

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COMORBIDITY OF OBSESSIVE-COMPULSIVE AND ANOREXIC BEHAVIORS  
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## VITA

Amanda Margaret Marie Mulfinger grew up in the suburbs of Minneapolis, Minnesota, with her parents, Don and Mary Mulfinger, and her brothers, Jeff and Michael. She had a happy and healthy childhood, playing piano, reading books, and hanging out with her friends. She was generally carefree until she graduated as valedictorian from Apple Valley High School and left home to attend Harvard University. She emerged four years later a humbler, more critical, and less carefree individual. A highlight of those years was being selected to give a speech, “Success According to Harvard,” at her Class Day. Beginning in 2002, she spent four happy and healthy years in Auburn, occasionally re-discovering the carefree individual she once was, but generally being burdened under the sparse positive reinforcement schedule that is graduate school in clinical psychology. She had some incredible supervisors, and a one-of-a-kind major professor, all of whom positively impact her work today. Currently, Amanda is completing her internship in Clinical Psychology at Hennepin County Medical Center in Minneapolis (having come full circle geographically), and looks forward to spending long, luxurious, dissertation-free days with her friends, family, and two lovely cats in the beautiful Twin Cities.

DISSERTATION ABSTRACT  
COMORBIDITY OF OBSESSIVE-COMPULSIVE AND ANOREXIC BEHAVIORS  
IN UNDERGRADUATE FEMALES

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The present study explored the behavioral and personality differences between individuals who manifest anorexic behaviors, obsessive-compulsive behaviors, both, or neither. A large literature base exists outlining the diagnostic comorbidity of anorexia and obsessive-compulsive disorder in clinical populations, and several theories note the common constructs between the two disorders. Few researchers have studied non-clinical populations, or attempted to examine behavioral differences between these four groups.

The purpose of this study was to identify significant differences in personality traits, offspring-reported parenting styles, psychopathology, and behavior between four groups: individuals with anorexic and obsessive-compulsive behaviors, individuals with one or the other, and those with neither. It was hypothesized that individuals with anorexic and obsessive-compulsive behaviors would report more severely disordered

behaviors, more dysfunctional personality traits, higher levels of psychopathology, and less supportive and involved parents. Specific behavioral differences were also expected and outlined. Of primary interest were the ways in which individuals with anorexic and obsessive-compulsive traits differed from both those with just anorexic behaviors and those with just obsessive-compulsive behaviors.

The results of this study supported the hypothesis that individuals with both sets of behaviors generally had the highest impairment. More specific hypotheses had varied levels of confirmation; the results supported some, but failed to support others. Notably, individuals who develop both behaviors differ from those with anorexic behaviors by being slightly less gregarious; by having parents that use fewer positive parenting techniques, less supervision, and corporal punishment; by having higher levels of general psychopathology; and by exhibiting a more severe, qualitatively different depression. They differ from those with just obsessive-compulsive behaviors by being more perfectionistic, self-conscious, vulnerable, depressive, and less gregarious; by having parents that are less involved, use fewer positive parenting techniques, less supervision, and other forms of discipline; and by having higher levels of general psychopathology, state anxiety, bulimic symptoms, difficulty with sexuality and social integration, and exhibiting a more severe, qualitatively different depression.

Some potential explanations for the obtained results are considered, and ideas for future research are discussed.

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The stress of this dissertation would have completely overwhelmed Amanda if it were not for her incredible family, who listened patiently to her endless tales of woe, and her wonderful friends at Auburn. Glenna Rousseau and Jeshmin Bhaju were fabulous supporters, and Kelly Farris was beside her through every step of this process. Without being able to share the misery of each step with Miss Farris, Amanda likely would have given up and used her clinical skills behind the bar at Bodega (which I believe is now closed, so it wouldn't have been a good career move).

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## I. INTRODUCTION

### *Anorexia*

Anorexia nervosa is a complicated psychiatric disorder that affects young women and men on the biological, psychological, environmental, and interpersonal levels. It is a disorder characterized by an intense fear of gaining weight, a general refusal to maintain a “normal” body weight (the DSM-IV sets a cutoff point of 85% of expected weight for height), inappropriate emphasis placed on weight and distorted body image, and amenorrhea among women (American Psychiatric Association, 1994). Loss of menses is decreasingly reliable as a diagnostic criterion due to the common use of oral contraception to regulate women’s periods (Bulik, Reba, Siega-Riz, & Reichborn-Kjennerud, 2005). Diagnosable anorexia is not a common disorder; rates among females in America are estimated at around 0.5% (Klein & Walsh, 2003). However, rates are dramatically higher among certain populations, particularly female adolescents and college women, and some research suggests that overall rates are rising (Bulik, Sullivan, & Tozzie, 2006; Wakeling, 1996; Mitchell & Eckert, 1987). Although the average age of onset is between 15 and 19 (Bulik et al., 2005), some evidence indicates that rates are also rising among young children (Gowers, Crisp, & Joughin, 1991). Men are also vulnerable to the disorder, but there is a ratio of 1:10-20, males to females (Fairburn & Beglin, 1990). For the purposes of this study, women only are considered.

*Risk Factors for Anorexia.* Anorexia is a difficult disorder to study thoroughly, partially as a result of its low prevalence and incidence. Longitudinal studies become

impractically expensive and time-consuming, with a low level of true diagnoses, particularly when one wishes to study the subtypes of anorexia and/or bulimia. In addition, risk factors are difficult to isolate because they are similar to the prodromal symptoms of the eating disorder. Therefore, most of the research on anorexia (with at least one notable exception, which will be discussed at length) has been conducted retrospectively or cross-sectionally. Although more high-quality research is needed to isolate protective factors, authoritative consensus has been reached concerning at least some of the factors that place individuals at risk for anorexia. Importantly, not one of these susceptibilities can be labeled the cause of anorexia; the disorder appears to be multi-factorial, brought about by an interaction of situational, temperamental, genetic, and/or environmental factors.

Until the last several years, the trend in the field was to look for a biological or genetic marker for anorexia (Steiner et al., 2003). Much valuable information on heritability and biological risk factors came from this research, but more recent research has switched to the study of psychological and social factors. Within the biological realm, however, the familial connection of anorexia has been well-established, with one study indicating that more than 50% of the variance of anorexia occurrence might be accounted for by genetic factors (Klump et al., 2002). It is important to remember, however, that families share environments as well as genetics, and while Klump et al. (2001) suggest that the risk of anorexia or bulimia among female relatives of an anorexic proband is 7 to 20 times that of the general population, it is unknown whether this is due to genetic heritability or other shared factors. In addition, anorexia most likely develops according to the stress-diathesis model; an individual may be born with a genetic susceptibility to



the disorder, but it might not be manifest until an environmental stressor exacerbates it. Other studies support the heritability of anorexia, indicating that siblings of probands have a prevalence rate of 3 to 10% (Steinhausen, 1995), significantly higher than the overall prevalence, noted earlier, of less than 1%.

Recent studies have found a link between birth month (Eagles, Andrews, Johnston, Easton, & Millar, 2001) and “temperature at conception” (Watkins, Willoughby, Waller, Serpell, & Lask, 2002) and risk of anorexia. Eagles et al. indicated that most anorexics (in their sample) had birthdays between March and June, while Watkins et al.’s British sample indicated a pattern of early-onset cases being conceived in warm months. Specifically, non-clinical restricting anorexics were particularly likely to fit the “temperature at conception” theory. More research is needed to increase the viability of birth and conception month as risk factors for anorexia.

Anorexia seems to appear most often among teenage girls, between the ages of 15 and 19, during the middle stages of adolescence. This is an extremely stressful time for girls, as their bodies are rapidly changing, hormones are fluctuating, and social influences are shifting away from parents and toward peers (Hendren, 1990). Therefore, some authors suggest that puberty itself is a risk factor for anorexia (Klein & Walsh, 2003). More specifically, it seems that the stress associated with puberty serves as an activator for a genetic or temperamental diathesis present in some teenage girls.

The environment of young women is clearly an important factor in whether or not they develop an eating disorder, specifically anorexia. The environment includes their familial situation, their social system, and the larger environment in which they are exposed to media and societal messages. Dysfunction within anorexics’ families is

generally present at higher frequencies than in the families of control populations (McDermott, Batik, Roberts, & Gibbon, 2002). Specific family functioning issues will be discussed later, but it is important to acknowledge the increased risk that an unstable family situation places on a young girl. Behaviors of both parents are significant. Stice, Agras, and Hammer (1999) found that maternal behavioral disinhibition (i.e., less ability/desire to inhibit externalizing behaviors), hunger, body dissatisfaction, and paternal obesity all contributed to the onset of secretive eating. In addition, low maternal weight during a child's infancy predicted inhibited eating. According to Stice et al., all of these behaviors could potentially be precursors to disordered eating or anorexia on the part of the parents. Another study (Johnson, Cohen, Kasen, & Brook, 2002) investigated behaviors of fathers of anorexics, indicating that low levels of paternal affection, communication, time, and education are associated with higher levels of anorexia. Several studies have suggested that the influence of parents is significant in elementary-age children (e.g. Agras, Hammer, & McNicholas, 1999; Schur, Sanders, & Steiner, 2000); 50% of these children want to weigh less, 16% admit to dieting, and 75% report that they learned about dieting from their family.

As mentioned, some effort has been extended toward longitudinally studying the onset and course of anorexia. One extremely valuable resource that has been utilized by several researchers is the Swedish Population and Housing Census of 1995 (Statistics Sweden, 1998). This census contains information about every person born in Sweden between the years 1973 and 1992. Lindberg and Hjern (2003) were able to prospectively and longitudinally study individuals who developed anorexia and to suggest potential risk factors, based on the information gathered at the time of the census. Interestingly, the

prevalence for Swedish females was 0.22%, somewhat lower than the rate among American women (0.5%). These authors found that girls in families of a “white-collar profession” had a higher incidence of anorexia than those from lower SES levels. In addition, children from the Middle East and Africa had much lower prevalence rates than those with a Northern or Central European background, suggesting a significant cultural influence on “ideal” body type, with thinness being of primary importance in those of Caucasian background. Several psychosocial factors also seemed to put children more at risk, including parental psychiatric disorder, history of foster care, and adoption (especially inter-country). Adoption as a risk factor for anorexia has been observed in the United Kingdom as well (Holden, 1990). Finally, Lindberg and Hjern took advantage of information regarding maternal pregnancies, noticing that girls born between 23 and 32 weeks had a higher incidence of anorexia than those carried 33 to 36 weeks. While complications during pregnancy did not present an increased risk for anorexia, complications during delivery did increase the observed incidence of anorexia. Interestingly, mothers who gave birth between the ages of 25 and 28 had daughters who were more likely to develop anorexia than were daughters of younger mothers. Bulik et al. (2005), using the same database, added that being small for gestational age also increased the risk of developing anorexia. All this evidence raises questions about how prenatal factors affect the later incidence of anorexia. Finally, because of lower reported BMI’s (calculated via self-reported height and weight) among mothers of anorexic daughters, these authors hypothesized that the prematurity of births may have been a correlate of suboptimal nutrition on the parts of the mothers.

Another study (Bulik et al., 2006) took advantage of Sweden's thorough records to prospectively examine risk factors for anorexia among twin cohorts born in Sweden between 1935 and 1958. All available and consenting twins from the Swedish Twin Registry were contacted and screened for a broad range of psychopathology, including anorexia. This older sample had a much higher prevalence of anorexia than that of Bulik et al.'s 2005 study; 1.2% of the females in the sample met DSM-IV diagnostic criteria. The authors found a pattern of higher prevalence among the younger participants (those born after 1945). The most significant risk factor, other than being female, that emerged from interviews conducted in 1972 and 1973 was a high level of neuroticism; individuals with anorexia reported higher lifetime rates of major depressive disorder and generalized anxiety disorder. Interestingly, this study indicated that women with a history of anorexia reported higher current levels of health and health satisfaction. They also seemed to be somewhat "protected" from later overweight, as only 12.5% of the historically anorexic subsample developed overweight, compared to 36.5% of the rest of the sample. This finding certainly does not suggest that anorexia promotes good health; it may instead be indicative of the continuation of sub-threshold anorexic symptoms after weight restoration.

Several personality traits have been studied at length and appear to be risk factors for anorexia, if not part of the disorder itself. The traits most consistently seen in women with anorexia include rigidity, perfectionism, obsessiveness, and harm avoidance (e.g. Halmi et al., 2000). However, as personality is a main facet of this study, a more detailed section is devoted to personality traits as risk factors later in the paper.

*Anorexia among college students.* Although anorexia is a relatively uncommon disorder, it appears with far greater frequency among some populations than others. The most commonly described and researched populations include adolescent females (especially those on hospital inpatient units) and female college students. Different authors pose different theories as to why these groups (and women in particular) are more vulnerable to anorexia, but those in the field seem to concur that psychosocial factors play a significant role. Girls and women in these subgroups are especially vulnerable to societal pressures as a result of their age and emerging independence. Often, these are the individuals who are struggling to “discover” themselves. Because the study reported here focuses on female college students, this narrative is focused primarily on that population.

Research with college women and anorexia generally focuses on those with less severe anorexia, as they are still functioning well enough to be in school. In fact, women with anorexia are often very high-achieving students, encouraged by their families, tending to be well-organized, perfectionistic, and often quite rigid with their self-discipline (Stern et al., 1989). In a sense, the same traits that put them at risk for anorexia help them to be good students.

Measured rates of anorexia on college campuses have varied widely, for several reasons. Most studies assess a small sample of women at one university or college, in one city or town, in one region of the country, precluding national or even regional characterization. Many studies do not achieve a representative cross-section of the population in terms of race, intelligence, SES, or academic major, and some contain other methodological errors such as not using consistent or up-to-date diagnostic criteria. However, even with these inconsistencies, it is somewhat informative that a range of

rates of eating disorders, specifically anorexia, exists on college campuses. Three different female populations in one study showed rates of anorexia between 1% and 4.2% (Pope et al., 1984). Klemchuk, Hutchinson, and Frank (1990) measured pathological weight preoccupation at 10.1% in a college student population. Mintz and Betz (1988) reported that 1 to 2% of college women have anorexia, but only 33% of the 643 women studied reported “normal” eating behaviors. Bulimia is present in far greater numbers in all these studies, ranging from 3% (Mintz & Betz, 1988) to 19% (Powers, Schulman, Gleghorn, & Prange, 1987).

Although rates of anorexia among college females vary, rates among subgroups demonstrate illuminating differences. Groups that provide the most intriguing contrasts to baseline rates include college athletes, specifically those involved in sports where leanness is desirable (e.g. ballet, gymnastics). Several studies have shown that eating disorders have higher than baseline prevalence rates on women’s athletic teams (e.g. Pasmán & Thompson, 1988; Taub & Blinde, 1992). Other researchers have hypothesized that social groups, like sororities, may also have higher than baseline rates of eating disorders. One study found that of 229 college women, sorority members showed a significantly higher percentage of purging than did those in a comparison group (Meilman, von Hippel, & Gaylor, 1991). Alexander (1998) compared a group of female athletes (including dance teams) with a group of sorority members, and included a control group who participated in neither athletics nor Greek life. His findings did not reach statistical significance, but showed strong trends for highest rates of disordered eating among athletic groups, followed by sorority members, followed by controls, lending

support, in some quarters, to the theory that eating disorders cluster in certain social groups.

Much lore exists regarding the prevalence of eating disorders, specifically anorexia, as a disorder of upper-class white American women. However, because of the increasingly high levels of access to media, women of all backgrounds are exposed to the types of stimuli that are assumed to further the prevalence of eating disorders. Edwards-Hewitt and Gray (1993) explored more thoroughly some popular beliefs about racial differences in a study conducted at three universities: two primarily African-American universities (one in the southeast and one in the northeast) and one predominantly white-American university. In a total sample of 379 women, the authors found that the only racial differences were in the areas of bulimia and binge eating; white Americans scored higher on both of these measures. Interestingly, southern women scored relatively low on Body Dissatisfaction (a subscale of the EDI), and there were no significant differences resulting from socioeconomic status, level of acculturation, or television influences.

Another common assumption associated with anorexia posits that women with anorexia maintain a much lower energy balance than healthy women through excessive exercise or caloric restriction. However, Pinkston et al. (2001) point out that “negligible empirical evidence (p.170)” exists to support this assumption. Most studies that use a comparison group for anorexic individuals use “normal weight” individuals. Their study investigated general psychopathology, eating disorder symptoms, dieting, exercise behaviors, and calorie consumption among restrictive anorexic college students and comparable-mass controls, that is “naturally thin” women. They found no difference in composition of diet (levels of macronutrients), although the anorexic women consumed

smaller portions than their comparable-weight controls. In addition, although the anorexic women reported higher levels of exercise, their actual recorded energy expenditure did not differ from that of the control group, suggesting that distortion among anorexics is not limited simply to body image. Importantly, the notion of distorted body image has been empirically supported. Heilbrun and Friedberg (1990) assessed college women's accuracy in reporting their body sizes, and found that those whose personality profiles most closely matched those with anorexia had the highest level of overestimation of body size. The authors suggested that this is a behavior more typical of women at risk of developing anorexia than of those who have already met criteria. The distortion likely contributes to their motivation for restricting their diets; once a certain weight has been reached the disorder potentially takes on a life of its own.

As mentioned, Mintz and Betz investigated eating behaviors along a spectrum and found that only 33% of college women reported "normal" eating behaviors. Although the authors eliminated anorexic and obese individuals from their sample, they found that 61% of the women they studied had an "intermediate form" of an eating behavior problem, which they divided into the following categories: chronic dieting (11.4% of sample), bingeing (15.6%) or purging (10.3%) alone, and subthreshold bulimia (26.9%). An additional 3% met current DSM criteria for bulimia. This study highlights serious concerns over the eating behaviors of all college women, not just those with diagnosable eating disorders, and raises questions about how college women are receiving the message that thinness is more desirable than physical health.

*Anorexia in children.* Eating disorders in children are quite rare, especially compared to the high prevalence among adolescents and college students. However, with



the ever-increasing societal pressure for females to be thin, and the increasing sophistication of young girls, particularly in the United States, the age of onset has been creeping downward (Vedul-Kjelsas, 2005). One of the complicating factors of childhood-onset anorexia is the issue of diagnosis. Because of the rarity of anorexia in children, cases often are confused for disordered-eating medical diseases, often of an organic origin. An illustrative article (Robins & Putnam, 1999) outlines the etiological and diagnostic differences between eating disorders and other problems. Children often present with eating problems in the following three groupings: 1) swallowing dysfunction (dysphagia), 2) vomiting, and 3) food aversion/selectivity/avoidance. Many symptoms associated with these problems are also seen in eating disorders, including weight and appetite loss, food refusal, vomiting, and high rates of depression and anxiety. Robins and Putnam suggest that the etiology of these disorders is often inorganic, further confusing them with eating disorders. Unintentional vomiting is especially stress-related, paralleling the binge and purge cycles associated with bulimia.

In order to distinguish between a medical and psychological eating condition, doctors must pay close attention to the motivation of the child, specifically the reported desire to lose weight or the lack thereof. Although the problems may serve any number of functions for the child (e.g. excused absence from uncomfortable family dinners, increased attention, etc.), if weight loss and body image are not associated with the symptoms, the problem is likely not an eating disorder. Often, young girls with eating disorders will deny the presence of a problem (Robins & Putnam, 1999), another characteristic that distinguishes them from children with medical problems.

Unfortunately, medical problems like the ones listed above can become risk factors for

eventual development of an eating disorder. As children reach adolescence and social pressures become more intense, the side effects of their disorder (specifically, weight loss) may become increasingly appealing, setting the stage and providing the vehicle for intentional weight loss through food restriction and/or vomiting. In fact, according to the popular media, one young actress actually developed an eating disorder after losing weight during a medical hospitalization.

Family functioning is another important factor in early development of anorexia. Many studies have explored the functioning of anorexics' family systems, documenting a pattern of dysfunction (e.g. McDermott, Batik, Roberts, & Gibbon, 2002; Garner, 1993; Waller, Calam, & Slade, 1989). Specifically, factors like conflict, lack of cohesion, familial attitude toward body satisfaction, and emphasis on achievement can all contribute to the development of an eating disorder (Laliberte, Boland, & Leichner, 1999). One study used the Family Adjustment Device General Functioning Scale (McDermott et al., 2002) to measure levels of familial functioning in families with child and adolescent restricting anorexics, bingeing/purging bulimics, and individuals with Eating Disorder, Not Otherwise Specified (EDNOS). Compared to community norms, they found that the eating disordered groups had uniformly higher levels of dysfunction. However, it is difficult to determine causal direction in these situations. Certainly, the experience of having a family member with active food restriction creates a high-stress environment that could set the stage for familial dysfunction. McDermott et al. suggest that anorexia-specific concerns (e.g. malnutrition, hospital visits, etc.) at least exacerbate family issues that may be already present to a slight degree.

Interestingly, not all studies report high levels of dysfunction in families of anorexics. Casper and Troiani (2001) interviewed both probands and their parents; they found that restricting anorexics (as opposed to bingeing/purging anorexics) did not differ from healthy controls in reports of family functioning. In fact, many of the adolescents interviewed in the study reported higher levels of functioning than controls, in terms of role performance, relationship with their mothers, and their own physical health. It is possible that the interview format of this study captured a sense of overcompensation on the part of the adolescent patients, a trait that frequently accompanies restrictive eating behaviors. Specifically, the patients may have been responding to the “enmeshed” relationship anorexic females often have with their mothers. Because of their tendency toward perfectionism, there may also have been internal pressure to present themselves in a good light.

It is important to remember that having a child or family member suffering from anorexia can be an extremely tiring, stressful, and frustrating experience. In order to investigate the issues that these families regularly address, Cottee-Lane, Pistrang, and Bryant-Waugh (2004) interviewed 11 parents of childhood onset anorexics in Europe. They organized their primarily qualitative data, and found that parents primarily ran into difficulty with three main issues: 1) understanding the eating disorder, 2) the impact of the eating disorder, and 3) managing the eating disorder and its impact. Understanding the eating disorder is difficult for parents for several reasons. First, it is challenging to recognize the disorder for what it is, particularly because of the challenges that young girls face under “normal” circumstances. In addition, parents have difficulty analyzing the disorder and assessing how it may have begun. One parent referred to the impact of

the disorder as being “the dreadful monster,” meaning their child acted in ways that were previously out of character and often devious. In addition, the stakes of the disorder are exceedingly high, causing a young girl to miss out on many social aspects of life and often becoming dangerously ill. Finally, the impact was described as pervasive and overwhelming, taking over every aspect of the family’s life. Managing the disorder was the third major problem, and parents explained their frustration with their child’s seeming stubbornness, and unwillingness to help themselves. They had difficulty taking control, not knowing what sort of limits to set with their child. Finally, parents often lacked a source of support and understanding. Even though some people in their lives were supportive, it was difficult to find people who could truly understand the unique challenges they were facing. Parents of anorexics clearly have a unique and informative perspective on their child’s behavioral problems, which a few authors have used to their advantage. The study of Cottee-Lane et al., for example, obtained information from both individuals and their mothers, presenting a more balanced, well-rounded picture of the effects of anorexia.

#### *Obsessive-Compulsive Disorder*

Obsessive-compulsive disorder is a debilitating disorder characterized by recurrent, pervasive, and intrusive obsessions and/or compulsions. These obsessions and compulsions are time-consuming, and cause significant distress and interference in the affected individuals’ life. The DSM-IV (APA, 1994) defines obsessions as “recurrent and persistent thoughts, impulses, or images that are experienced, at some time during the disturbance, as intrusive and inappropriate and that cause marked anxiety and distress.” Compulsions are defined as “repetitive behaviors (e.g., hand washing, checking) or

mental acts (e.g., praying, counting) that are engaged in to prevent or reduce anxiety or distress.” The DSM-IV also requires that an individual must at some time during the course of his or her disturbance recognize that the obsessions and compulsions are excessive and unreasonable. In general, OCD is conceptualized as the presence of anxiety-provoking obsessions which are followed by compulsions to reduce the presence and severity of the anxiety. However, compulsions are not always behavioral, as seen above in the definition of compulsions; mental compulsions also serve to reduce anxiety.

Although obsessive-compulsive disorder (OCD) is not the most prevalent of all mental disorders, or even all anxiety disorders, its impact on an individual and his or her family can be far-reaching and dramatic. Because of the difficulty associated with treating the disorder, particularly after one’s obsessions and compulsions have become a regular part of one’s life, much interest has turned to the identification of risk factors. Researchers hope that if they can identify factors that increase an individual’s vulnerability to OCD, then improved treatments can be begun at earlier points in the development of the disorder. Rates of lifetime OCD ranged from 1.9% to 3.3% in the National Institute of Mental Health’s Epidemiologic Catchment Area (ECA) survey (Leaf, Myers, & McEvoy, 1991), and current estimates place the prevalence between 1% and 3% (Rasmussen & Eisen, 1990).

*Risk factors for OCD.* Many factors have been hypothesized to be early predictors of OCD, including perinatal complications (Vasconcelos, Sampaio, & Hounie, 2007), high intelligence (Rasmussen & Tsuang, 1984), genetic factors, parental mental health (Neziroglu, Anemone, & Yaryura-Tobias, 1992; Lenane et al., 1990), socioeconomic status, and the presence of eating disorders (Kasvikis et al., 1986). However, according to

Douglass, Moffitt, Dar, McGee, and Silva (1995), none of these have reliably differentiated between those who do and do not suffer from OCD. In their longitudinal analysis of 930 individuals who had self-reported OCD symptoms at age 18, they failed to support many of the theorized risk factors as actual vulnerabilities to the disorder. Specifically, no differences were apparent between OCD individuals and “healthy” controls on measures of perinatal problems/complications, parental education, maternal IQ, parental SES, neuropsychological abnormalities, symptoms of Tourette’s Syndrome, or speech abnormalities. The only possible difference between the two groups was a higher IQ in the OCD group, although this finding did not reach significance. Interestingly, Douglass et al. did find a higher prevalence than expected (4%), and noted that most of the individuals with OCD did not present with both obsessions and compulsions, but one or the other. Of course, this finding may be questionable in light of the diagnostic criteria for OCD, in which afflicted individuals must experience both obsessions and compulsions in order to receive the diagnosis. Among those individuals with obsessions in Douglass et al.’s study, males were most likely to have the persistent thought that they had “accidentally done something that harmed or endangered someone,” while females most often worried that “relatives who are away have been hurt or killed.” Males with compulsions most often counted, while females most often checked.

While Douglass et al. failed to find associations between many environmental factors and later development of OCD, other studies have reported such associations. In a review of OCD phenotypes, Miguel et al. (2005) examined the feasibility of subtyping the disorder in order to find more reliable associations between environmental factors and

morbidity. Some studies have found that individuals with early-onset OCD are more likely to have suffered from tic disorders as children (e.g. Diniz et al., 2004). Early-onset OCD is also unique in that it is more often found in males (Zohar et al., 1997) and individuals are more frequently found to have compulsions in the absence of obsessions (Rosario-Campos et al., 2001). Additionally, Lensi et al. (1996) found that individuals with early onset were more likely to have suffered pre- and perinatal adverse events. Young mothers are also more vulnerable than others (non-mothers and older mothers) to OCD (e.g. Maina, Albert, Bogetto, Vaschetto, & Ravizza, 1999), perhaps partly resulting from the sharp increase in responsibility that accompanies the onset of parenthood.

Other studies have recorded early risk factors more consistently than the aforementioned studies. One of the most common, and most well-researched, vulnerabilities for OCD is the presence of tics or Tourette's Syndrome in childhood. In a longitudinal, prospective study, Peterson, Pine, Cohen, and Brook (2001) examined the often comorbid incidence of tics, OCD, and ADHD. A sample of 976 individuals were studied as children between the ages of 1 and 10, and 776 of these were studied again 8, 10, and 15 years later. The authors replicated others' findings that OCD is associated with high IQ. In addition, tics in childhood were associated with OCD in late adolescence and early adulthood. Symptoms of ADHD in mid-childhood/early adolescence predicted symptoms of OCD in late adolescence and early adulthood. Interestingly, Peterson et al. also found that conduct problems in early childhood were predictive of OCD symptoms in later childhood, and separation anxiety in later childhood was predictive of OCD in late adolescence. This study also added support to the theory that onset of OCD is bimodal, with one peak in adolescence (12-14) and another in early adulthood (22-24;

Rasmussen & Tsuang, 1986). This mimics the bimodal onset of anorexia, also peaking in early adolescence and early adulthood.

The bimodal distribution of OCD onset has been studied in terms of differential course, epidemiology, and risk factors. In a review of postinfectious and other forms of OCD (Leonard et al., 1999), evidence is presented indicating that the association between tics and OCD is stronger for individuals who present with OCD symptoms in childhood. These cases are also more often seen in boys (e.g. Leonard et al., 1992; Douglass et al., 1995). This gender association is true for familial histories of tic disorders, in addition to personal histories. Comorbidity with OCD is not limited to tic disorders, but also appears with other forms of psychopathology. Geller et al. (1996), in a study of children and adolescents with OCD, found that 90% of the cases at their clinic had at least one comorbid condition. Disruptive behavior disorders were the most common, appearing in 70% of cases.

More recently, information on the unique cognitive styles associated with OCD has been gathered and reviewed. Rachman, Shafran, and Riskind (2006) are particularly interested in OCD individuals' elevated sense of responsibility, and how this affects the development of obsessions and compulsions. In addition, individuals who score high on measures of OCD also display selected perceptions and memory biases (Amir & Kozak, 2002). It is difficult to say whether these cognitive factors serve as risk factors for OCD, or whether they are side effects or symptoms of the disorder. Although the evidence for their prevalence within these individuals is robust, unique cognitive styles are not limited to those who develop OCD, but also show higher than average rates within other psychopathologic populations and those with more extreme personalities (i.e. severe



personality disorders; Amir & Kozak, 2002). Specifically, highly perfectionistic individuals have demonstrated higher perceived responsibility than controls in a classification task following a responsibility-inducing manipulation (Bouchard, Rheume, & Ladoucer, 1999). Interestingly, perfectionism is one of the traits commonly associated with both OCD and anorexia. A high level of perceived responsibility is not the only cognitive factor prevalent in individuals with OCD; they also commonly display thought-action fusion (TAF; Lopatka & Rachman, 1995) and a sense of looming vulnerability (Riskind, Williams, Gessner, Chrosniak, & Cortina, 2000). Significantly, thought-shape fusion, a specific form of TAF in which individuals place unrealistic effective power on their thoughts to affect their body shape, is common in undergraduates with eating disorders (Rachman, Shafran, Mitchell, Trant, & Teachman, 1996), a finding that highlights one more cognitive link between anorexia and OCD. It is certainly clear that individuals with OCD demonstrate unique cognitive styles; what is unknown is whether cognitive uniqueness is a vulnerability that places them at risk for OCD or other forms of psychopathology or is a characteristic that develops along with OCD.

The temperament of individuals with OCD has been studied frequently, both in prospective and retrospective studies. Researchers have found consistently that individuals with OCD score higher than average on measures of neuroticism, one of the “Big Five” personality dimensions (Miguel et al., 2005). In addition, high levels of neuroticism are seen more often in relatives of individuals with OCD than in relatives of controls (Samuels et al., 2000). Family studies have also demonstrated higher rates of OCD and OCD-related comorbid diagnoses (Nestadt et al., 2003), OCPD (Samuels et al., 2000), and tic-related disorders (Pauls, Alsobrok, Goodman, Rasmussen, & Leckman,

1995) in relatives of OCD probands than in relatives of comparison probands.

Conversely, relatives of AN probands are more likely than relatives of comparison probands to have diagnoses of OCD (Bellodi et al., 2001).

*OCD in children.* OCD is generally considered a chronic (Stewart et al., 2004) and debilitating anxiety disorder. Importantly, the disorder manifests itself differently in children versus adults, although children and adults experience similar prevalence rates (Rapoport et al., 2000). In addition, some research supports the idea that OCD symptoms change within childhood and between childhood and adulthood (Rettew, Swedo, Leonard, Lenane, & Rapoport, 1992), highlighting the importance of independently studying distinct age groups. Recently, researchers in the field have established that OCD is more common among children and adolescents than had previously been believed (Heyman et al., 2001), so more attention is turning to the ways that OCD differs in children versus adults. The two most common ways that researchers have attempted to examine patterns of symptom presentation in children are factor analysis and cluster analysis.

McKay et al. (2006) used factor analysis to identify possible ways in which children manifest symptoms of OCD differently than adults. In their review of factor analyses conducted with adults, they established that Leckman et al.'s (1997) model best summarized the research. Leckman et al. established that adults' symptom patterns seem to fall into four main factors: obsessions/checking, symmetry/ordering, contamination/cleanliness, and hoarding. While the 137 OCD-diagnosed children in McKay et al.'s sample also fit best into a four-factor model, the factors differed from those of adults. Children seem to endorse symptoms in the following four factors:

compulsions, sexual/aggressive obsessions, superstitions, and hoarding/ordering/somatic concerns. One of the major qualitative differences between children and adults is that children's compulsions seem to be often based on magical ideation, rather than correlated with their obsessions.

In a study similar to McKay et al. (2006), Ivarsson and Valderhaug (2006) used cluster analysis to develop a typology of OCD symptom manifestation in Norwegian children. They administered the Children's Yale-Brown Obsessive-Compulsive Scale to 213 outpatient children, and found that a five-cluster model fit the data best. These clusters were: Mental Rituals, Touching, and Ordering; Contamination and Cleaning; Superstitions; Obsessions/Checking and Confessing; and Somatic Concerns. The subgroups that have emerged in research with adults (e.g. Hoarding, Symmetry/Ordering) were not present in this sample, as these behaviors seemed to be equally distributed among all the clusters. A consistent finding in almost all of the research on childhood OCD is that the disorder is extremely heterogeneous, making the division of symptoms into clusters and factors potentially valuable exercises.

One question that arises when studying children with OCD is why some children develop the disorder and some do not. Risk factors associated with OCD in general (and with adults) have already been discussed, but some researchers have specifically studied children to establish what makes some more or less likely to develop OCD. Temperament is one of the factors of interest to researchers who have examined the onset of OCD. Drawing upon the diathesis-stress model, temperament (closely intertwined with genetic makeup) can establish a diathesis that makes one more vulnerable to OCD under particularly stressful situations. One of the first studies to examine temperament in

childhood OCD (Ivarsson & Winge-Westholm, 2004) used parent report of 83 patients with OCD, half children and half adolescents. Four realms of temperament were measured via the EAS (Emotionality, Activity, Sociability) questionnaire (Buss & Plomin, 1984): emotionality (the tendency to become upset easily and intensely), sociability (the tendency to seek social interaction), activity (the tendency to be energetic), and shyness (definitions from Goodyer, Ashby, Altham, Vize, & Cooper, 1993). Shyness, in broad terms, measures behavioral inhibition, which in turn has been linked with the presence of anxiety disorders (Hirshfield et al., 1992). Although Ivarsson and Winge-Westholm (2004) were the first to establish a direct link between behavioral inhibition and OCD, other temperamental factors have been empirically associated with the disorder, including harm avoidance and low levels of novelty-seeking and self-directedness (Cloninger et al., 1993; Lyoo et al., 2001). Interestingly, these response styles have also been robustly linked with anorexia.

Additional findings by Ivarsson and Winge-Westholm (2004) included higher ratings on Emotionality and Shyness by OCD patients and lower ratings on Activity compared to age and gender-matched controls. In a cluster analysis of the patients, two subgroups emerged. One group (*uninhibited*) scored higher on Emotionality, Activity, and Sociability, and lower on Shyness. The other group (*inhibited/shy*) scored lower on Activity and Sociability, and higher on Shyness. This discrepancy further highlights the heterogeneity of childhood OCD, and suggests that two distinct forms of OCD may exist.

Although the study of temperament helps shed light on the role of genes and personality in the onset of OCD, the diathesis-stress model indicates that a stressor must occur in order to bring about the symptoms of the disorder. Stressful life events (SLE)

constitute a well-researched subfield of psychopathology, and many theories suggest that these events act as catalysts for many types of mental disorders (Hettinga, Kuhn, & Prescott, 2006; Brown, Junster, Heimberg, & Winning, 1998). The general quantitative theory suggests that the most important aspect of SLE is the number of events one person experiences. The general qualitative theory suggests that nonspecific qualities of the events are most important (e.g. level of trauma, salience, etc.). Finally, the specific qualitative theory emphasizes the importance of specific events for specific pathologies. Researchers have explicitly examined these theories with OCD patients, finding that individuals with OCD report more “total life events” (e.g. weddings, moves, graduations, accidents, crimes, job changes, etc.) and more SLE than “normal” controls (McKeon, Roa, & Mann, 1984). Interestingly, most cases indicate that these events occurred either in childhood or in the year prior to the onset of an anxiety disorder (Newman & Bland, 1994), and one longitudinal, prospective study demonstrated that risk of anxiety increased as SLE persisted or escalated (Rueter, Scaramella, Wallace, & Conger, 1999).

In one study (Gothelf, Aharonovsky, Horesh, Carty, & Apter, 2004), children with OCD were compared to children with other anxiety disorders and to controls in order to establish differences in temperament and quality and quantity of SLE. As hypothesized, children with OCD reported more numerous significant life events and more numerous negative life events during the year before onset. In addition, they reported more numerous negative lifetime events and perceived the events as having more impact than did controls. Although there was not a significant difference between children with OCD versus those with other anxiety disorders, those with non-OCD anxiety disorders consistently scored between children with OCD and controls, which the

authors labeled a “strong trend” for increased severity in children with OCD. The one significant difference between groups with OCD and with non-OCD anxiety disorders was the higher incidence of “major illness or injury of a relative” among children with OCD. Consistent with other temperament research, children with OCD scored significantly higher on harm avoidance. A significant negative correlation between self-directedness and negative life events was also present among children with OCD. The authors outline the theory behind the diathesis-stress model in children with OCD quite well: “Genetic factors (which may be related to allelic variations of genes of the serotonergic system) induce a harm avoidance tendency in children. When these children encounter a life stressor (a major illness or injury in a relative), they tend to perceive it more negatively such that pathological anxious mechanisms are activated, which leads to the onset of AD, especially OCD (Gothelf et al., 2004, p. 196).”

#### *Obsessiveness in Anorexia*

Over the last 25 years, much attention has turned to the distinct personalities and characteristics of individuals suffering from anorexia nervosa. Specifically, researchers have observed that anorexics seem to demonstrate behaviors and thought processes in common with individuals suffering from obsessive-compulsive disorder (OCD). A great deal of research has been devoted to measuring rates of lifetime and current OCD in anorexic samples (see Godart, Flament, Perdereau, & Jeammet, 2002 for a review), while a smaller subset of researchers have measured rates of anorexia in samples with OCD (Kasvikis, Tsakiris, Marks, Basoglu, & Noshirvani, 1986; Rubenstein, Pigott, L’Heureux, Hill, & Murphy, 1992; Grilo et al., 2003). The rates of lifetime OCD diagnoses among samples of individuals with anorexia have ranged from 9.5% to 62% (Godart et al.,

2002). Anorexia is diagnosed in 6% to 13% of individuals with OCD, significantly above the baseline rate of approximately 0.5% in the general female population (Wakeling, 1996). Interestingly, although rates of anorexia are much higher in females than in males, at least one study found that the gender difference disappeared in an OCD population (Rubenstein et al., 1992), raising questions about potential gender bias in the diagnosis of anorexia or the mediating effect of obsessions and/or compulsions.

A great deal of research has also examined the issue of comorbidity of anorexia with personality disorders, as many behaviors associated with anorexia seem to be of characterological origin. Overall, researchers agree that the personality disorders of Cluster C, particularly obsessive-compulsive personality disorder (OCPD), are most commonly associated with anorexia. One study found that 93% of admitted anorexics had a personality disorder (Kennedy, McVey, & Katz, 1990). The anorexics in this study did not have stable diagnoses throughout treatment, suggesting that the acute state of an eating disorder alters a person's measured personality traits. In addition, Kennedy et al. found that all measured scales (Millon Clinical Multiaxial Inventory—MCMI [Millon, 1985] and Borderline Syndrome Index—BSI [Conte, Plutchik, Karasu, & Jerrett, 1980]) decreased upon recovery except for compulsiveness. Two tentative conclusions can be drawn from this finding. First, anorexia may bring out or exacerbate deviant personality characteristics. Second, compulsiveness may be somewhat more stable than other traits, and may be a risk factor for developing anorexia.

Most people who have known an anorexic woman probably have anecdotal evidence of her “quirky” personality traits, particularly perfectionism and obsessiveness, a general feeling that everything had to be “just so.” However, it is still unknown whether

anorexia exacerbates and/or causes these traits, or if the traits are a risk factor for the development of anorexia. Unfortunately, prospective research with such a low-prevalence disorder is prohibitively large-scale and expensive, so retrospective research is much more commonly done. Even so, at least one prospective study exists and has been published. In this study, a community group born in 1970 was followed for 21 years and 51 individuals with current or lifetime anorexia (the majority were weight-restored) were compared to 51 matched controls approximately six years after onset (Gillberg, Rastam, & Gillberg, 1995). Interviewers blind to group membership administered the SCID-I and SCID-II and assigned appropriate diagnoses. At the time of the study, 29.5% of the women with a history of anorexia also met criteria for OCPD, compared to only 6% of the controls. In addition, 31% of the anorexic women met criteria for lifetime OCD and 20% for current OCD, compared to 8% and 6% of the controls (Rastam, Gillberg, & Gillberg, 1995). The authors posited that Axis II functioning was more predictive of the course of anorexia than the anorexic symptoms themselves. Specifically, those individuals with more problematic personality traits were less likely to have a positive prognosis for their eating disorder.

Many researchers have assumed that traits which are evident after full weight restoration were likely present before the acute state of the disorder, conveniently bypassing the logistical problem of doing prospective research. For this reason, much research has incorporated long-term follow-up designs to measure personality traits in weight-restored, recovered anorexics. One study found that of 10 weight-recovered anorexics, three met criteria for OCPD, compared to six of 16 individuals with a history of anorexia and bulimia and eight of 28 individuals recovered from bulimia (Matsunaga



et al., 2000). Another study (Pollice et al., 1997) followed 22 anorexic inpatients from treatment to weight recovery and found that obsessive symptoms were highest at individuals' lowest weights. The symptoms improved, but were still elevated after weight gain; symptoms were also elevated in a group of long-term recovered anorexics. However, Windauer, Lennerts, Talbot, Touyz, and Beumont (1993) argue that many researchers incorrectly assume that weight gain and renewal of menstruation equate to "recovery;" in their study, 12 of 16 weight-recovered anorexics still had a restricted eating pattern with low nutritional intake. Notably, the above studies, as well as many others, draw their conclusions based on very small sample sizes, limiting the interpretability of any results.

One of the first studies that connected obsessiveness with anorexia measured personality traits in several anorexic individuals (Smart, Beumont, & George, 1976). Comparing these individuals, still in treatment, to normative data on the measures used, Smart et al. concluded that anorexic individuals seem to have severe obsessional features. Unfortunately, without the benefit of any sort of comparison group (healthy control, recovered anorexic, outpatient anorexic, etc.), the results were inconclusive. Later researchers measured personality traits of anorexic patients using the Middlesex Hospital Questionnaire (MHQ; Stonehill & Crisp, 1977). These researchers compared their patient group to a group of controls and found that the anorexics scored higher on the obsessional scale of the MHQ. Furthermore, they re-assessed participants immediately following treatment and at a follow-up four to seven years later. According to questionnaire data, the anorexic individuals exhibited a measured but not significant tendency toward fewer and less severe obsessions immediately following treatment and

had significantly lower scores at the follow-up years later. In addition, Strober (1980) compared anorexics to depressed and personality disordered comparison groups and found that anorexic individuals reported more severe and disabling symptoms of obsessiveness than did his participants with personality disorders.

Many researchers, when measuring obsessiveness or counting number of OCD symptoms in anorexic individuals, exclude eating-related obsessions in an effort to control for the effect of anorexic symptoms on obsessive symptoms. Even with this adjustment, one study found that 19 anorexics had significantly elevated scores on the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), when compared to 14 healthy controls (Kaye et al., 1992). Furthermore, their scores were similar to individuals diagnosed with OCD. Interestingly, no difference was found between Y-BOCS scores of underweight and weight-restored anorexics, suggesting stable obsessiveness. Furthermore, Kaye et al. concluded that anorexic individuals appear to minimize or deny OCD symptoms, which could be a result of a desire to appear perfect. Alternatively, these individuals may be completely unaware that their behaviors are abnormal, an artifact of the ego-syntonic nature of their symptoms. Bastiani, Rao, Weltzin, and Kaye (1996) had similar findings when they compared Y-BOCS scores of in- and out-patient anorexics with Y-BOCS scores of OCD in- and out-patients; scores were similarly elevated, but qualitative differences in symptom presentation existed. Several other studies have also found elevations in obsessions and compulsions in anorexics compared to control groups (Cassidy, Allsopp, & Williams, 1999; Speranza et al., 2001; Wentz-Nilsson, Gillberg, Gillberg, & Rastam 1999).

Although research overall has been remarkably consistent in establishing a relation between obsessiveness and anorexia, not all findings have been the same. Fahy (1991) failed to find a relation between eating disorders and the presence of obsessive-compulsive traits. He cites selection bias as the reason for such consistent findings in other research. He specifically criticizes the almost exclusive use of inpatient populations for this research, arguing that inpatient groups naturally have more characterological deviance than outpatient individuals.

From the above review, it is evident that many researchers have studied the construct of obsessiveness without distinguishing between obsessive personality characteristics (typical of OCPD) and classic obsessions and compulsions that one sees in diagnosable OCD. In order to outline relevant qualitative differences between anorexics with and without certain obsessive behaviors, it will be important to distinguish between OCD and OCPD behaviors.

#### *Course of Comorbid Anorexia and OCD*

Much research with anorexics indicates that the severity of concurrent obsessive symptoms is closely related to the severity of the eating disorder, often fluctuating in tandem with the anorexic symptoms. Because obsessive symptoms continue to be associated with anorexia, researchers have examined the effect these symptoms have on the outcome of the eating disorder. Zubieta, Demitrack, Fenick, and Krahn (1995) used the SCL-90R Obsessive-Compulsive Scale (Derogatis, 1977) to measure obsessiveness in anorexic patients and found that 78% of patients were highly obsessional. They also observed that anorexic patients who had higher scores related to OCD symptoms at presentation for treatment appeared to have more severe eating disorders and more

significant psychopathology. Similarly, patients who ended treatment with higher obsessive-compulsive symptoms demonstrated a more severe course of anorexia. In short, the presence of concurrent OCD symptoms increased the severity of the anorexic disorder. However, another study with 27 anorexics (only 10 of whom had comorbid OCD) found that improvement in anorexia was not significantly correlated with presence or absence of concomitant OCD (Thiel, Zuger, Jacoby, & Schubler, 1998). However, during a follow-up, those individuals who evidenced the most improvement in anorexic symptoms also had the highest reduction of obsessions and compulsions. Stronger conclusions could be stated if the sample size were larger, but the data offer some support for the suggestion that obsessive or compulsive tendencies may be exacerbated or provoked during the stress of an acute eating disorder.

*Comorbid Axis II psychopathology.* In general, anorexic individuals with comorbid personality disorders demonstrate a poor prognosis relative to those without Axis II psychopathology (Skodol et al., 1993). Many eating-disordered individuals with comorbid personality disorders have a slower recovery rate than individuals without a personality disorder (Herzog, Keller, Lavori, Kenny, & Sacks, 1992). They also generally receive lower GAF scores (Axis V) when rated by mental health workers, evidencing a lower degree of functioning, and exhibit greater chronicity of their eating disorder symptomatology (Skodol et al., 1993). Similarly, it appears that individuals with more eating disorder symptomatology have higher levels of general psychopathology and higher deviance in personality traits (Bloks, Hoek, Callewaer, & van Furth, 2004). Individuals with less comorbid psychopathology seem to experience more positive changes in their personality traits during the course of eating disorder treatment. The

relationship between eating disorders and personality disorders appears particularly strong in inpatient populations, but still significant with outpatients. For example, in a study with 210 anorexic outpatients, 27% had a personality disorder (Herzog et al., 1992), compared to rates as high as 93% in inpatients. It appears that deviant personality characteristics, such as OCPD, are often associated with a more severe course of anorexia.

#### *Nature of Obsessive-Compulsive Symptoms*

Some research has supported the idea that, although individuals with OCD and anorexia have similar rates of obsessiveness, the nature of the obsessions and compulsions differs between the groups. For example, in one study, recovered anorexic patients were administered the Y-BOCS, and exhibited higher scores than a healthy control group, particularly on obsessions surrounding symmetry and exactness, repeating, fear of embarrassment, and on compulsions involving rereading and rewriting (Srinivasagam et al., 1995). These individuals reported that the impairment from the obsessions and compulsions had been more severe during their acute disordered phase, but they still had the characteristics to a lesser degree after recovery. Another study found similar results, revealing that the symptoms most commonly endorsed by anorexic individuals are those related to symmetry and order (Bastiani et al., 1996), as well as house cleaning, counting, rereading, and rewriting compulsions. These authors concurred with Kaye et al. (1992), concluding that the nature of the symptoms and the ego-syntonic state in which they were experienced, made anorexia entirely distinct from classic OCD. However, individuals with OCD also exhibit ego-syntonic symptoms (American Psychiatric Association, 1994). It is possible that anorexia may lie on a spectrum with

OCD, characterized by eating-related obsessions and compulsions and ego-syntonic experience of symptoms. In general, ego-syntonic symptoms indicate a higher level of severity, so anorexia could typify a more severe dimension of OCD.

In a retrospective study, recovered anorexic women were asked to report on childhood obsessive-compulsive symptoms by referring to a list of described behaviors (Anderluh, Tchanturia, Rabe-Hesketh, & Treasure, 2003). The data suggested that OCD symptoms are a risk factor for anorexia, and that they persist after recovery, as a background of obsessive-compulsive symptoms was most significant for women who reported current symptoms of OCPD. The participants also filled out a trait checklist; for every additional obsessive or compulsive trait reported, the estimated odds ratio for having an eating disorder increased by 6.9%. One of the most persistent symptoms, maintained after weight restoration, was a preoccupation with orderliness.

### *The Effects of Starvation*

As indicated, researchers still do not agree about the nature of the interaction between OCD behaviors and anorexic behaviors. It is not clear which appear first, in which individuals, or why. For example, Deep, Nagy, Weltzin, Rao, and Kaye (1995) found that 63% of individuals with anorexia had a lifetime diagnosis of OCD, and 75% had some kind of significant anxiety. Although age of onset of OCD was not specifically measured, age of onset of all other anxiety occurred before the onset of anorexia. Another study with anorexic and bulimic inpatients found that, of the 21% of anorexics with OCD, 75% reported an age of onset prior to anorexia (Godart, Flament, Lecrubier, & Jeammet, 2000). In addition, 65% of the 58 anorexics studied by Speranza et al. (2001) reported earlier onset of OCD, while OCD tended to precede anorexia in 35 anorexics

studied by Thornton and Russell (1997), 37% of whom had OCD and 35% of whom had OCPD. Although literature supports the idea that most women who develop both OCD and anorexia develop the OCD first, there is still a substantial minority who experience anorexia prior to the onset of OCD.

Some researchers believe that the psychological effects of self-starvation cause many individuals with anorexia to develop OCD. Along with others, Holden (1990) argues that the diminution of obsessions and compulsions that occurs with weight recovery points at the crucial role that denutrition and starvation play in the development of OCD in anorexics. Little research exists to describe the effects of starvation on one's physical and mental health. However, a landmark study was conducted in Minnesota near the end of World War II which provided valuable information about these effects (Franklin, Schiele, Brozek, & Keys, 1948). This study observed 36 healthy male conscientious objectors between the ages of 20 and 33 as they voluntarily underwent a six-month "semi-starvation" diet and a three-month subsequent rehabilitation. During the diet, the individuals underwent extreme physical changes, losing an average of 24% of their body weight. More notably, significant personality changes were observed and food-related obsessions developed. The majority of the men began to obsess about food and calories, some began excessive workout regimens, others began to hoard food and eat in ritualized patterns. All these behaviors are typical of individuals with anorexia, and they all have a flavor of OCD. The results of this study lead some researchers to believe that the denutrition associated with anorexia, at the very least, exacerbates OCD symptoms, and may even be the cause of significant obsessions and compulsions. However, the majority of the obsessions and compulsions displayed by the conscientious

objectors were directly related to food and eating, while anorexics display non-food-related symptoms as well. In fact, many researchers have excluded food-, body-image-, and exercise-related symptoms when assessing anorexic individuals for OCD (e.g. Bastiani et al., 1996; Kaye et al., 1992).

### *Current Study*

The question of whether OCD leads to anorexia or vice versa remains unanswered. Even with a large-scale, longitudinal, prospective design, it is likely that the issue would not be decided. Very possibly, there is no uniformly correct answer; it seems that in some individuals anorexia occurs first, while OCD precedes anorexia in others, and the two develop concurrently in still others. Rather than attempting to answer the question of sequence, this study investigated the behavioral differences between individuals who develop anorexia with and without the comorbid symptoms of OCD. By gathering comprehensive personality and psychopathology data on undergraduate females who have developed both disorders, one or the other, or neither disorder, I endeavored to establish the typical behaviors of women in each category. Initially, the goal was to collect collateral data from mothers to establish an accurate age of onset, as well as severity and frequency of symptoms, as no previous studies have used such information. However, strikingly few mothers responded to two separate requests for information, so too little data was gathered to draw significant conclusions. Future research should attempt new methods to incorporate collateral data.

Few previous studies have examined behaviors typical of non-clinical individuals. This study did just that, highlighting symptomatic differences between individuals in all categories while also gathering data on childhood behaviors and participant report of



parenting styles. For example, measures of parental discipline and nurturance were incorporated, as many childhood (and adult) behaviors are directly affected by the behavior of the parents. The non-clinical, undergraduate population utilized for this study helped answer questions about behaviors that, while problematic, have not yet reached a severely pathological level.

### *Hypotheses*

Overall, it is likely that the AN+OC group will be the most impaired of the four groups, simply as a function of exhibiting more symptoms initially. However, it is hypothesized that there will be other significant group differences as outlined below. Hypotheses are arranged by measure administered.

*Eating Attitudes Test (EAT)*. It was hypothesized that the AN+OC group would have higher scores than AN, as it is assumed that the addition of obsessive-compulsive behaviors makes anorexic behaviors more pronounced and problematic. In addition, because of the relation between obsessions/compulsions and anorexic problems, it was expected that OC would be significantly higher than C, implying that individuals who are only reporting OC symptoms may still have higher levels of eating pathology than those without any reported OC or AN symptoms.

*Eating Disorders Inventory (EDI)*. It was hypothesized that AN+OC would score highest on the EDI, followed closely by AN, assuming that anorexic behaviors would be more severe in individuals that also struggle with obsessive-compulsiveness. There would likely be a significant difference between these two groups and OC, and another significant difference between OC and C, assuming that non-eating disordered individuals with OC behaviors still have some eating-related difficulties. It was also

hypothesized that there would be significant differences between all four groups on several of the subscales of the EDI. Subscales would presumably help distinguish between the AN+OC and AN groups, thereby establishing important qualitative differences in the types of disordered eating both groups exhibited. It was hypothesized that AN would score the highest on Drive for Thinness, as this is the primary diagnostic symptom of individuals with anorexic behaviors (see DSM-IV-TR), and Maturity Fears, as anxiety about pending adulthood and separation from mothers are notorious hallmarks of pure anorexia (Friedlander & Siegel, 1990). It was also hypothesized that there would not be a significant difference between C, OC, and AN+OC on Bulimia, as bulimic behaviors are more associated with impulsiveness than compulsiveness. Another hypothesis suggested that AN+OC would score highest on Ineffectiveness, Perfectionism, and Interpersonal Difficulty

*Obsessive-Compulsive Inventory (OCI)*. It was hypothesized that both the Frequency and Distress scales of the OCI would correlate with NEO-PI Neuroticism and EDI Perfectionism, as these are two personality traits that are common among individuals with OC behaviors (Wu, Clark, & Watson, 2006). It was expected that they would correlate negatively with Extraversion and Openness, due to social discomfort and rigidity.

*Alabama Parenting Questionnaire (APQ)*. It was hypothesized that the AN and AN+OC groups would report the highest levels of parental involvement (PI) on the APQ, reflecting the often over-enmeshed nature of families with anorexic individuals (Strober & Humphrey, 1987). A second hypothesis regarding the APQ posited that the AN+OC group would have the highest levels of reported parental poor monitoring/supervision

(PM), reflecting lack of parental concern over the self-destructive behaviors that were being demonstrated by their children. It is possible that these behaviors were simply overlooked due to limited parental supervision.

A third APQ-related hypothesis suggested that those with the highest scores on inconsistent discipline (ID) would have the highest scores on subjectively negative personality traits (Neuroticism and subscales) as measured by the NEO-PI, the lowest scores on subjectively positive personality traits (Extraversion and Openness with their subscales, Agreeableness, and Conscientiousness). This hypothesis builds on the theory that inconsistent discipline in childhood sets the stage for disturbed personality traits and personality disorders (Lengua, 2006). Furthermore, because of the association between inconsistent parenting styles and bulimia (Fairburn, Welch, Doll, Davies, & O'Connor, 1997), it was hypothesized that ID would correlate positively with SIAB Bulimic Symptoms, Inappropriate Compensatory Behaviors, Atypical Binges; and EDI Bulimia.

*Florida Obsessive-Compulsive Inventory (FOCI)*. It was hypothesized that scores on the FOCI would correlate positively with EDI Perfectionism and Neuroticism, and negatively with Openness. Perfectionism and neuroticism are personality traits that seem to fit into the spectrum of obsessive-compulsive behavior, while the rigidity that is common in OC individuals does not leave much space for openness to ideas, values, or philosophies. It was also hypothesized that the FOCI would correlate negatively with Openness (for similar reasons), and positively with EDI Ineffectiveness and SIAB—General Psychopathology. Individuals who are burdened by their obsessions and compulsions are unlikely to feel effective in most settings, and are quite likely to fall victim to other forms of psychopathology.

*NEO Personality Inventory (NEO-PI)*. It was hypothesized that the AN+OC group would have the highest mean scores on Neuroticism (due to the greater overall psychopathology in this group), followed by OC (assuming that common anxiety will correlate the two), and then AN; all three groups would have higher levels than the C. On the Extraversion scale of the NEO-PI, it was hypothesized that C would score highest, followed by OC, AN+OC, and AN, due to the higher assumed levels of social discomfort in the pathological groups. For the same reason, it was hypothesized that C would score highest on the Agreeableness scale of the NEO-PI, followed by OC, AN+OC, and AN. On the Openness scale of the NEO-PI, it was hypothesized that C would again score the highest, followed by OC, AN+OC, and AN, operating on the assumption that the rigidity that tends to accompany both AN and OC behaviors would limit the openness to experience of individuals in these groups. On the Conscientiousness scale of the NEO-PI, it was hypothesized that AN+OC would score highest, followed by OC, AN, and C. Presumably, conscientiousness and obsessive-compulsiveness fall on the same spectrum, with OC behaviors on the pathological end; anorexic behaviors would likely broaden the range of conscientious behaviors.

*Beck Anxiety Inventory (BAI)*. It was hypothesized that the AN+OC group would evidence the most anxiety on the BAI, followed by the OC group, and then the AN. The AN+OC and OC groups are both diagnostically anxious, and it is likely that the presence of AN symptoms will only exacerbate the anxiety that already accompanies OC symptoms. Further hypotheses suggest that C would have the least anxiety, as suggested by group categorization, and that a significant difference would exist between OC and

AN. This difference was hypothesized due to the anxiety-based nature of OC symptoms versus the eating-centered nature of AN symptoms.

*Beck Depression Inventory (BDI)*. It was hypothesized that the AN+OC group would have the highest self-reported levels of depression on the BDI, because of the overwhelming evidence that depressive symptoms accompany most other psychiatric disorders (Brieger, Ehrt, & Marneros, 2003). In addition, AN would likely have significantly higher levels than OC because of the high levels of comorbid depression with anorexia. Finally, it was hypothesized that qualitative differences in reported symptoms would likely be present, specifically that AN (and possibly AN+OC) would have more loss of energy, tiredness, etc., resulting from the malnourishment associated with chronic under-eating. This hypothesis was tested via an item-by-item analysis of the BDI.

## II. METHOD

### *Participants*

The participants were drawn from the female undergraduate population of Auburn University, and were divided into four groups based on screening data. The first group (AN+OC) included 18 women with significant current restrictive food intake or dieting behaviors, typical of women with anorexia, as well as significant obsessions and/or compulsions. Individuals in this group had a score of at least 30 on the Eating Attitudes Test (EAT; below), at least 15 on the Eating Disorders Inventory (EDI; below), and at least 40 on the Obsessive-Compulsive Inventory (OCI; below). Although these women exhibit behaviors typical of individuals with anorexia and obsessive-compulsive disorder, it is important to recognize that placement into this group does not imply either diagnosis. The second group (AN) included 24 women with significant restricting/dieting behaviors, but non-significant obsessions or compulsions. Criteria for this group included a score of at least 30 on the EAT, at least 15 on the EDI, and less than 40 on the OCI. Again, inclusion in the group does not indicate a diagnosis of anorexia. The third group (OC) included 20 women with significant current obsessions and/or compulsions, but no significant restricting/dieting behaviors. Women in this group scored at least 40 on the OCI, less than 30 on the EAT, and less than 15 on the EDI, but were not assumed to have a diagnosis of obsessive-compulsive diagnosis. Finally, the comparison group (C) included 21 women with neither significant dieting/restricting behavior nor obsessions or compulsions. These women scored less than 30 on the EAT, less than 15 on the EDI, and

less than 40 on the OCI. Because these criteria created a group that included the remainder of the women who participated in the initial screening task, women who scored the lowest on all measures (i.e., had the fewest eating and/or obsessive-compulsive disturbances) were contacted for the follow-up surveys.

An online screening procedure was implemented to identify female undergraduates who met criteria for the above groups. Extra credit was offered as an incentive for students taking classes in the following departments at Auburn: Psychology, Nutrition and Food Sciences, and Human Development and Family Studies. Recruiting flyers were posted in the relevant buildings and professors and teaching assistants were asked via email to announce the extra credit opportunity to their students. The flyer and announcement both contained brief descriptions of the purpose of the study, eligible students, compensation (extra credit), contact information, and the website at which the surveys could be found. (See Appendix B for a copy of the flyer.) In addition, several screening sessions were held, at which students could fill out the surveys in a computer lab and have questions answered by a research assistant. The formal screenings were discontinued due to a lack of attendance.

Students who chose to go through the screening process were directed to a website where they were asked to complete several surveys online, including an informed consent and a demographic sheet (see Appendix D). The informed consent was read and signed before they filled out any surveys, and the demographic sheet was finished upon completion of the surveys. The website was designed so that each survey required completion before the participant could move on to the next questionnaire. The screening surveys included the Eating Disorders Inventory (EDI), the Eating Attitudes Test (EAT),

the Alabama Parenting Questionnaire (APQ), and the Obsessive-Compulsive Inventory (OCI). It was estimated that participants would not require more than one hour to fill out the surveys.

#### *Self-Report Measures for Screening Process*

The instruments used in the screening process were selected based on relevance of measured construct(s), adequate psychometric properties, and relative brevity.

*Eating Disorders Inventory (EDI)*. The EDI (Garner, Olmstead, & Polivy, 1983) was developed as a multidimensional self-report measure of disordered eating behaviors, including behaviors at issue in anorexia and bulimia. This 64-item survey has been used in several hundred studies (Thiel & Paul, 2006) as a measure of eight different aspects of eating disorders: 1) drive for thinness, 2) bulimia, 3) body dissatisfaction, 4) ineffectiveness, 5) perfectionism, 6) interpersonal distrust, 7) interoceptive awareness, and 8) maturity fears. Participants respond to forced-response, 6-point answers, and receive scores of 0 to 3. Responses are scored according to severity, with the most pathological response choice receiving a 3, the second most severe response receiving a 2, the third most severe response receiving a 1, and the three least pathological responses receiving scores of 0 (Garner & Olmstead, 1983). The EDI has good internal consistency (.93 for Total EDI; .79 to .92 for scale scores) and scale inter-correlations (scales correlated with total EDI scores from .36 to .79; Raciti & Norcross, 1987), as well as adequate criterion, construct, convergent, and discriminant validities (Espelage, Aggen, Mazzeo, Quittner, Sherman, & Thompson, 2003). In a study comparing the EAT-12 (a shorter version of the original EAT), the EDI, and the Eating Disorder Examination Questionnaire (Fairburn & Cooper, 1993), individuals with anorexia scored significantly



higher on all measures of eating problems than did non-weight-preoccupied individuals (Engelsen & Laberg, 2001). A study measuring internal consistency and factor structure of the EDI produced Cronbach alphas ranging from .80 to .91, further supporting the internal consistency of the measure (Eberenz & Gleaves, 1994).

According to the manual (Garner & Olmstead, 1983), the scoring of the EDI is to be transformed with non-clinical populations. That is, instead of being scored on a 6-point scale, a 4-point scale is suggested. However, the factorial integrity and subscale internal consistencies have been unsatisfactory when this transformation is conducted (Schoemaker, van Strien, & van der Staak, 1994). For this reason, this study did not use the transformation. One other study (Limbert, 2004) investigating factor structure and internal consistency of the EDI in a non-clinical sample used the 6-point scale as well, and found that the factor structure was maintained only with five of the eight subscales (drive for thinness, perfectionism, bulimia, interpersonal distrust, and maturity fears), suggesting that the EDI might not be measuring all the intended facets. While this is a potentially important issue for diagnostic assessment, the EDI was used here merely to identify women with weight preoccupation.

*Eating Attitudes Test (EAT)*. The EAT (Garner & Garfinkel, 1979) is a 40-item scale designed specifically to measure behaviors typical of individuals with anorexia nervosa. Like the EDI, the EAT requires forced-choice responses. The most pathological of six responses are scored 3, 2, or 1, while the three “healthy” responses receive scores of 0. Although some of the concepts measured are similar to those measured by the EDI, the EAT is based on empirical, inductive reasoning, while the EDI was developed deductively or theoretically (Garner et al., 1983). In addition, the EAT measures broader

concepts than those measured by the EDI. For this reason the common authors of both scales do not recommend either as a replacement for the other. Finally, the EAT has been demonstrated to have a high false-positive rate when used in non-clinical populations (e.g. Mumford, Whitehouse, & Choudry, 1992), so combining data from the two surveys should help to “purify” the sample. The EAT and EDI have been compared and cross-validated with very positive results. In one study (Raciti & Norcross, 1987), cross-classification analyses indicated 90% agreement between the total EAT score and the EDI Drive for Thinness subscale, as well as 85% agreement on “weight preoccupation.”

The criterion validity of the EAT has been tested by comparing response patterns of women who did and did not have eating disorders, according to DSM-IV criteria. The EAT was shown to have an accuracy rate of 91% when differentiating between nonclinical women with and without an eating disorder (Mintz & O’Halloran, 2000). The Mintz and O’Halloran study was important because the EAT was developed before the creation of the DSM-IV, so its concordance with DSM-IV diagnoses was unknown. Particularly with the reported false positives generated by the EAT, it was important to check its validity vis-à-vis the revised criteria in the newest DSM. In the Mintz and O’Halloran study, women with full- or partial-syndrome eating disorders had a mean score of 45.47 (SD: 17.39), while those without had a mean score of 13.17 (SD: 8.5). Other studies have reported mean scores between 44 (SD: 12.5; Dancyger & Garfinkel, 1995) and 58.9 (SD: 13.3; Williamson et al., 1995) for anorexics and a mean of 1.3 for controls (Dancyger & Garfinkel, 1995). Williamson et al. (1995) did not include a normal comparison group, instead dividing their participants into anorexics, bulimics, and

individuals with binge eating disorder (BED). For this reason, a comparison mean for non-eating disordered individuals was not available.

*Alabama Parenting Questionnaire—Child Form (APQ)*. The APQ (Shelton, Frick, & Wootton, 1996) is a 42-item self-report questionnaire designed to assess for parental discipline in five areas: parental monitoring and supervision, inconsistent punishment, corporal punishment, positive parenting, involvement, and “other” discipline practices. In addition, the APQ measures the parent’s instrumental and emotional nurturance. The measure was validated by its authors and was shown to have adequate internal consistencies for involvement, positive parenting, and inconsistent discipline ( $>.7$ ); however, its internal consistency was low ( $<.4$ ) for monitoring/supervision and for corporal punishment. The measure did show adequate stability and discriminant validity among clinical and volunteer samples. Importantly, the APQ was validated with 6- to 12-year-old children, and has not been extensively used with other age groups. However, the validation data so far are quite promising, and the present work should shed light on its value as a retrospective scale among college-age women.

An Australian study tested the psychometric properties of the APQ among a large population of 4- to 9-year-olds, and found test-retest reliabilities that ranged from .84 to .90 (Dadds, Maugean, & Fraser, 2003). In addition, the convergent validity of the APQ was confirmed by examining its correlations with two other established scales (Conduct Problems subscale of the Strength and Difficulties Questionnaire [SDQ; Goodman, 1997] and the Behavioral Inhibition Scale [Carver & White, 1994]). The APQ can be administered via the telephone or in person, and assesses both the child’s and parent’s report of discipline/nurturance behaviors.

The APQ is still a relatively new scale for measuring parenting style via both child and parent report. For this reason, it has been used in fewer studies, and with fewer populations, than other instruments of its kind. Most of these studies have correlated parenting style with conduct disorder and oppositional defiant disorder in children, especially boys (e.g., Hawes & Dadds, 2005), and no study has yet used it to assess the parenting styles to which individuals with eating disorders were exposed. However, the APQ has some of the most encouraging psychometric properties in its category, and measured most directly the constructs this study explored. Therefore, it was chosen as the most appropriate measure here.

*Obsessive-Compulsive Inventory (OCI)*. The OCI (Foa, Kozak, Salkovskis, Coles, & Amir, 1998) is a relatively new, 42-item self-report measure designed to quantify seven behaviors common to individuals with OCD, including: Washing (8 items), Checking (9 items), Doubting (3 items), Ordering (5 items), Obsessing (8 items), Hoarding (3 items), and Mental Neutralizing (6 items). Individuals respond to queries about both frequency and distress on a 5-point Likert scale, ranging from 0 (never) to 4 (almost always). Total scores for both frequency and distress can range from 0 to 168.

The authors described the psychometric properties of the OCI among individuals diagnosed with OCD, generalized social phobia, PTSD, and among non-anxious controls. Internal consistencies with clinical populations varied among the subscales (alpha = .68 to .94 for distress, and .72 to .96 for frequency). There were good to excellent test-retest stabilities across two weeks among patients with OCD ( $r_s = .77-.97$ ; Foa et al., 1998). In addition, respondents diagnosed with OCD had significantly higher mean scores on all subscales than did respondents with PTSD and social phobia, as well as the non-anxious

respondents. In a study of non-clinical college students (Simonds, Thorpe, & Elliott, 2000), the OCI total and subscale scores were shown to have good 4-week test-retest reliability ( $r_s = .69-.88$ ) and internal consistencies (all alpha coefficients  $> .70$ ), as well as good convergent validity with the Maudsley Obsessive-Compulsive Inventory ( $r_s = .61-.75$ ). Foa et al. (1998) also reported good to excellent internal consistencies and one-week test-retest stabilities ( $r_s = .68-.90$ ) for non-anxious controls. The factor structure of the OCI has been characterized using non-clinical populations as well; five of the seven subscales (checking, obsessing, washing, ordering, and hoarding) emerged as distinct factors (Wu & Watson, 2003).

The OCI was created as a self-report instrument comparable to the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989), which is generally administered as a semi-structured interview. The OCI improved upon the Y-BOCS and previous measures of obsessive and compulsive behaviors by incorporating a Likert scale to assess the severity of a broad range of symptoms. In addition, its self-report design makes it easy to administer to both clinical and non-clinical populations. A short version of the OCI (OCI-R; Foa et al., 2002) has been even more recently developed and has demonstrated sound psychometric properties in its initial validation studies and with a non-clinical college population (Hajcak, Huppert, Simonds, & Foa, 2004). However, the slightly higher reliability and validity scores and the adequacy of available time made the original OCI a better choice for this study.

#### *Self-Report Measures for Follow-up Study*

*NEO Personality Inventory (NEO-PI)*. The NEO-PI (Costa & McCrae, 1985) is one of the most commonly used inventories that measures personality traits in both

clinical and non-clinical populations. The concept of personality “traits” has been well-supported in the literature as being stable across the adult lifespan (e.g., Costa & McCrae, 1990). Personality psychologists (John & Srivastava, 1999; Raggatt, 200) generally agree that most human characteristics can be broken down into the five traits measured by the NEO-PI: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness.

The NEO-PI is a 181-item inventory in which individuals respond to items on a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*. Coefficient alpha scores for each of the five factors ranged from .76 (agreeableness) to .93 (neuroticism), with larger ranges on each of the sub-factors (Costa & McCrae, 1988). The 6-year stability of the factor scores ranged from .82 to .83, but the reliability of agreeableness and conscientiousness were not included in the study. One study (Costa & McCrae, 1992) compared the NEO-PI with the Personality Assessment Inventory (Morey, 1991) and the Basic Personality Inventory (Jackson, 1989), and revealed good convergent validity between the measures.

*Beck Depression Inventory—Second Edition (BDI-II)*. The BDI-II (Beck & Steer, 1993) is a 21-item questionnaire commonly used in research and clinical practice to track the depressive symptoms of both clinical and non-clinical populations. It was initially developed as a result of clinical observation and descriptions of clinical depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), but has since been revised and updated. Individuals respond to items in a forced-choice response, circling descriptors that best describe their own symptoms. Each item is scored from 0 to 3 based on severity,

and total scores range from 0 to 63. Items assess depressive symptoms such as appetite, sleep disturbance, suicidal thoughts, and anhedonia.

Likely as a result of its popularity, the BDI-II has been psychometrically tested in many different settings and with many distinct populations. In a study comparing the original BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) with the BDI-II (Dozois, Dobson, & Ahnberg, 1998), the BDI-II had a coefficient alpha of .91, compared to .89 for the BDI, both demonstrating high levels of internal consistency. The correlation between participants' scores on the two tests was .93 ( $p < .01$ ), indicating good convergent validity. In one of the first validation studies, the alpha coefficient of the BDI was .93 among college students and .92 among outpatients (Beck et al., 1996), further supporting high internal consistencies. In another study among 46 university students (Sprinkle et al., 2002), test-retest reliability measured .96, and BDI-II scores correlated strongly ( $r = .83$ ) with participants' number of SCID-I (First, Spitzer, Gibbons, & Williams, 1996) depressed mood symptoms. Finally, Pulos (1996) administered the BDI to 110 eating-disordered women (only 17 anorexics) within the first two weeks of treatment for the eating disorder. Pulos concluded that the presence of an eating disorder does not interfere with the BDI's measurement of depression, and supports Argus (1987) in suggesting that the BDI be used with eating disordered populations.

At least one meta-analysis has been conducted to combine the findings of the many studies examining the psychometric properties of the BDI-II (Yin & Fan, 2000). More than 1200 articles were sorted into four categories based on mention of reliability. Interestingly, only 7.5% of these articles reported meaningful reliability estimates. The authors found that the weighted average internal consistency reliability coefficients of

BDI scores (of the included studies) was about .84, while the average test-retest reliability coefficient was about .69. It is important to note that this meta-analysis studied the BDI, not the BDI-II, but its results inform the current study as the two versions are extremely similar, and demonstrate high convergent validity.

*Beck Anxiety Inventory (BAI)*. The Beck Anxiety Inventory (Beck & Steer, 1990) is a 21-item self-report questionnaire designed to assess the severity of anxiety symptoms. Respondents rank the severity of each listed symptom, and their responses are scored from 0 (*not at all*) to 4 (*severely, I could barely stand it*). It is a commonly used measure due to its ease of administration and the clinically relevant data it provides. Norms and psychometric properties of the inventory were initially collected among 160 psychiatric outpatients (Beck, Epstein, Brown, & Steer, 1988). Beck et al. reported high internal consistency (Cronbach's  $\alpha = .92$ ) and good test-retest reliability over one week ( $r(81) = .75$ ). In Beck and Steer's second study (Beck & Steer, 1991), they performed a principal component analysis and extracted four factors that the BAI seemed to assess: subjective, neurophysiological, autonomic, and panic. In a similar study among undergraduates, Borden, Peterson, and Jackson (1991) extracted five significant factors: subjective fear, somatic nervousness, neurophysiological, muscular/motoric, and respiration. In a more recent study among undergraduates (Osman, Kopper, Barrios, Osman, & Wade, 1997), four factors were retained, and the internal consistencies of the test were supported with a Cronbach alpha of .90 and adequate item-total score correlations. In another study among undergraduates, Creamer, Foran, and Bell (1995) compared scores on the BAI with data from the State-Trait Anxiety Inventory and the BDI. The BAI demonstrated comparable internal consistencies, achieving alpha scores of



.91 and .90 in two different testings. The test-retest reliability was only .62, which supports the usage of the BAI as a state measure.

*Florida Obsessive-Compulsive Inventory (FOCI)*. The FOCI (Goodman, 1994) was designed as the “little brother” of the Y-BOCS-SR (self-report version). Respondents check “yes” or “no” to a list of symptoms that they may or may not have experienced in the last month. These symptoms range from having unpleasant thoughts to catastrophizing to various compulsive behaviors, and include ten common obsessions and ten common compulsions. In addition, individuals respond to queries about how much time these behaviors involve; and levels of distress, control, avoidance, and interference they experience as a result of the behaviors. Individual scores range from zero to 20 on the Symptom Checklist, and zero to 25 on the Symptom Severity index. In its initial development, the FOCI, along with several other measures of OCD and other impairments (e.g., depression, global mental health), was administered to 113 obsessive-compulsive outpatients. The internal consistencies of the Symptom Checklist and the Severity Scale were good (Cronbach’s alpha = .83 and .89, respectively), and the two scales were moderately correlated ( $r = .38, p < .001$ ). Correlations with other measures of OCD severity, impairment, and depressive symptoms were moderate. The FOCI Symptom Checklist correlated significantly ( $p < .01$ ) with the Y-BOCS (obsessions: .29, compulsions: .43, and total score: .40), with the Clinical Global Impression scale (CGI: .29), and with the BDI (.35). The Severity scale had higher correlations (Y-BOCS Obsessions: .76, Y-BOCS Compulsions: .73, Y-BOCS Total: .78, CGI: .43, BDI: .63.). Correlations with the Hamilton Depression Rating Scale were more moderate (Symptom

Checklist: .34,  $p < .05$ , Symptom Severity: .30). Divergent validity was also measured and confirmed.

*Structured Interview for Anorexic and Bulimic Disorders—Self-Report.* The Structured Interview for Anorexic and Bulimic Disorders for DSM-IV and ICD-10 (SIAB-S; Fichter, Herpertz, Quadflieg, & Herpertz-Dahlmann, 1998) was designed as a self-report version of the interview created by the same authors (SIAB-EX; Fichter et al., 1991). Both the questionnaire and the interview include 87 items designed to assess for eating disorders, as well as states-of-affairs often associated with eating disorders (i.e. depression, anxiety, substance use). These questions assess behaviors along six components: Body Image and Slimness Ideal; General Psychopathology; Sexuality and Social Integration; Bulimic Symptoms; Measures to Counteract Weight Gain, Fasting, and Substance Abuse; and Atypical Binges. Individuals are asked to respond to items (e.g., “I experienced distress regarding binge eating”) on a Likert scale, ranging from 0 to 4, on which 0 = no, 1 = slightly, 2 = markedly, 3 = strongly, and 4 = very strongly (even desperation). Items that are not relevant to the respondent are scored an 8 (i.e., 8 = no eating binges). All questions on the SIAB-S are assessed for current and past symptomatology.

The SIAB-EX (interview format) has demonstrated good internal consistencies on five of its six components, ranging from .78 to .91 (Fichter et al. 1998). In addition, the interview has good interrater reliability (.86 to .96) and distinguishes well between subgroups of eating disordered individuals and healthy controls. However, because of the time and inconvenience associated with a structured interview format, the self-report measure was selected for use in the current study.

Fichter and Quadflieg (2000) compared the self- and expert rating scales to assess for comparability of psychometric properties. Blind interviewers used the SIAB-EX to assess 377 (primarily female) eating disordered inpatients two weeks after they filled out the SIAB-S at intake. The pairwise comparisons between these two instruments showed moderate correlation ( $r$ s between .3 and .6). In addition, Cohen's kappas ranged from .4 to .8, demonstrating good agreement. When diagnoses made by the SIAB-EX were directly compared to the SIAB-S, 194 of 279 individuals with a major eating disorder were correctly identified, while 78 of the 98 without a major eating disorder were correctly identified, resulting in a sensitivity of .70, a specificity of .80, and a positive predictive value of .91. When specific answers were compared, eating disordered individuals were found to report higher SIAB-S scores on items less specific to eating disorders (i.e., lack of self-confidence, depressive thoughts, depressed mood, anxieties, phobias, obsessive ruminations, compulsive checking), and higher SIAB-EX scores on more specific eating behaviors (i.e., behaviors of disordered eating, disturbed attitudes toward food and eating, items referring to social interactions).

#### *Research Assistant*

One undergraduate research assistant was recruited to help coordinate research and assist with gathering data from participants. She assisted with running screening sessions, contacted qualified participants to participate in the second wave of data collection, contacted participants' parents to request their assistance with filling out data, and helped with the interview process with the parents.

### *Procedure*

Those individuals who met criteria for any of the four groups (AN+OC, OC, AN, C) were invited, via phone or email, to participate in a one hour follow-up session, also online, in which they filled out the NEO-PI, the BDI, the BAI, the FOCI, and the SIAB-S. These questionnaires provided data on personality, depressive and anxious symptoms, and more thorough information on participants' obsessive-compulsive symptoms and eating patterns and behaviors. In return for filling out these surveys, each student received an additional hour of extra credit for her applicable class. In the initial informed consent, each participant consented to have her mother contacted by the research team. However, because of concern over how carefully undergraduates may or may not have read the informed consent form, each individual was re-contacted to remind her of her permission. If the participant was uncomfortable with her mother being contacted, she was asked to respond via email, at which point her mother was not invited to participate in the study.

For those individuals who did not object to parental contact, their mothers received an emailed letter asking for their assistance with a research study on behaviors in undergraduate females (see Appendix C for a copy of the letter). They were provided a link to a website similar to the ones their daughters encountered, and asked to fill out an informed consent, as well as the ABOS, the parent form of the APQ, and a demographic sheet. In addition, the mothers were asked to respond to the email with a convenient time for the researcher to call and ask them some follow-up questions, which would include the ADIS-IV: P, OCD and eating disorder modules. This interview, as well as the surveys that the mothers completed online, provided data on parenting style and discipline, the

participant's childhood OCD behaviors (if any), and the participant's childhood eating behaviors, as well as age of onset of each behavior. Had enough mothers participated in the study, these data would have then been compared to those acquired via each participant's self-report. Participants and those mothers who participated all received a debriefing email after data collection was completed (in order to prevent diffusion), which thoroughly described the purpose of the study, as well as hypothesized findings. Participants were encouraged to contact the principle investigator if they had further questions or desired more information.

### III. RESULTS

The following statistical analyses were performed to test stated hypotheses, as well as explore possible additional relations between and among variables. The primary goal was to identify significant group differences. Therefore, a variety of ANOVAs, MANOVAs, multiple regressions, and t-tests were performed, as well one discriminant analysis, designed to be parsimonious by limiting the number of included variables. The results are organized roughly by test used and hypothesis tested, followed by a description of the performed multiple regressions, general correlations, and discriminant analysis that incorporate two or more of the measures. ANOVAs were not performed on the EAT, EDI, or the OCI, as they were used to categorize participants.

#### *Results by Measure*

*EAT.* In order to test reported hypotheses on the EAT, Explore Descriptives were run on the four groups. Please see Table 1 (Appendix A) for means and SDs of each of the groups. As hypothesized, AN+OC did have the highest mean score, although not significantly higher than AN ( $p > .10$ ). An ANOVA and Bonferonni post hoc tests revealed that there were significant differences between AN+OC and OC ( $p < .001$ ) and AN+OC and C ( $p < .001$ ). When missing values were replaced with mean scores, the difference between OC and C was not significant ( $p = .156$ ), but when missing values were not replaced, the difference was significant ( $p = .037$ ).

*EDI.* The EDI was one of the tests that helped to categorize participants into groups. Therefore, ANOVAs were not run to test group differences overall. However, because of the potential discriminating qualities of the subscales, a MANOVA was performed to test for significant effects of group membership on the EDI subscales (Drive for Thinness [DT], Bulimia [BI], Body Dissatisfaction [BD], Ineffectiveness [IN], Perfectionism [PE], Interpersonal Distrust [ID], Interoceptive Awareness [IA], and Maturity Fears [MF]), specifically exploring stated hypotheses. Prior to running the MANOVA, missing values were replaced with the mean scores. There was a significant effect of group on the combined EDI subscales ( $F(24, 360) = 9.141, p < .001$ ; Wilks' Lambda = .252; partial  $\eta^2 = .369$ ). Analysis of each individual dependent variable showed that there was a significant effect on group membership for each of these subscales at the  $p < .001$  level.

Employing the Descriptives function and the Bonferonni post-hoc test, it was revealed that AN did not have the highest score on DT, failing to support the hypothesis. On the contrary, AN+OC scored the highest, but there was no significant difference ( $p > .10$ ) between AN and AN+OC. (Please see Tables 2 and 3 [Appendix A] for group means and SDs on EDI Total and each of the subscales.) Although it was expected that there would be no significant differences between C, OC, and AN+OC on BI, AN+OC was significantly higher than both C ( $p < .001$ ) and OC ( $p < .001$ ). AN+OC also had the highest scores on IN, PE, and ID, although not significantly higher than AN ( $p > .10$  on all three subscales); this group was significantly higher than both OC ( $p < .001$ ) and C ( $p < .001$ ) on all three subscales. Unexpectedly, OC did not score significantly higher than C on PE ( $p > .10$ ). Also contrary to stated hypotheses, AN+OC had essentially the same

score as AN on MF ( $p > .10$ ). On all of these subscales, AN+OC had the highest mean scores, followed by AN, followed by OC, followed by C. Notably, all of the non-significant differences existed between the AN and AN+OC groups, suggesting that these two groups had extremely similar response patterns on the EDI survey.

*APQ*: In order to test stated hypotheses, a MANOVA was performed to test for significant effects of group membership on APQ subscales (Parental Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline, Corporal Punishment, and Other Punishment). There was a significant effect of group on the combined APQ subscales ( $F(18,357) = 2.010$ ,  $p = .009$ ; Wilks' Lambda = .761; partial  $\eta^2 = .087$ ). Furthermore, there was a significant effect for each of these subscales except Inconsistent Discipline and Other Punishment (Parental Involvement:  $F(3,127) = 3.53$ ,  $p = .017$ ; Positive Parenting:  $F(3,127) = 6.18$ ,  $p = .001$ ; Poor Monitoring/Supervision:  $F(3,127) = 8.79$ ,  $p < .001$ ; Corporal Punishment:  $F(3,127) = 3.06$ ,  $p = .031$ ). Contrary to expected results, C had the highest levels of Parental Involvement, followed by OC, AN, and AN+OC; Bonferonni post hoc tests revealed that the only significant group difference was between AN+OC and C ( $p = .012$ ). On Positive Parenting, C again had the highest scores, supporting stated hypotheses. Bonferonni post hoc tests revealed that there were significant differences between AN and AN+OC ( $p = .019$ ), OC and AN+OC ( $p = .007$ ), and AN+OC and C ( $p < .001$ ) on Positive Parenting. Unexpectedly, OC did not have the highest scores on Poor Monitoring. Instead, AN+OC scored the highest, followed by AN, OC, and C, with significant differences between OC and AN+OC ( $p < .001$ ), and AN+OC and C ( $p = .001$ ).



Although no hypotheses were made regarding group differences on Inconsistent Discipline, hypotheses regarding its positive correlation with negative personality traits (Neuroticism:  $r = .003$ ,  $p = .488$ ), SIAB—Bulimia (Recent:  $r = .124$ ,  $p = .198$ ; At Worst:  $r = .163$ ,  $p = .131$ ), and EDI—Bulimia ( $r = .067$ ,  $p = .220$ ) were not supported. Interestingly, although no hypotheses were made regarding Corporal Discipline, Bonferonni post hoc tests revealed a significant difference between AN and AN+OC ( $p = .036$ ), with AN+OC scoring higher.

*FOCI.* In order to test stated hypotheses, bivariate correlations were performed with the FOCI (both presence of obsessions and/or compulsions [OC] and presence of distress and/or interference [DI]) and the EDI, NEO-PI (Neuroticism and Openness), EDI—PE, EDI—IE, and SIAB—GP, respectively. As expected, OC had a significant positive correlation with Neuroticism ( $r = .342$ ,  $p = .001$ ), but it did not have a significant negative correlation with Openness ( $r = .153$ ,  $p = .078$ ) or with EDI—PE ( $r = .155$ ,  $p = .074$ ). Interestingly, OC did correlate positively with Openness to Feelings ( $r = .221$ ,  $p = .020$ ). As expected, FOCI—DI had a significant positive correlation with SIAB—GP (Recent:  $r = .661$ ,  $p < .001$ ; At Worst:  $r = .617$ ,  $p < .001$ ). DI did not correlate with EDI—IN ( $r = .144$ ,  $p = .090$ ) or Openness ( $r = .084$ ,  $p = .220$ ), but it did correlate positively with EDI—PE ( $r = .202$ ,  $p = .020$ ).

A MANOVA was performed to test for significant effects of group membership on the two scales of the FOCI. There was a significant effect of group on the combined FOCI subscales ( $F(6,166) = 7.229$ ,  $p < .001$ ; Wilks' Lambda = .629). Univariate ANOVAs revealed that there was a significant effect for both of the subscales (OC:  $F(3,84) = 4.504$ ,  $p = .006$ ; DI:  $F(3,84) = 14.788$ ,  $p < .001$ ). Employing the Bonferonni

post-hoc test, significant differences were found between the OC and C ( $p=.040$ ) with OC scoring higher, and AN+OC and C ( $p=.010$ ) with AN+OC scoring higher, on Obsessions and Compulsions, and between the AN and OC ( $p=.006$ ; OC greater), the AN and AN+OC ( $p=.001$ ; AN+OC greater), the OC and C ( $p=0$ ; OC greater), and the AN+OC and C ( $p=0$ ; AN+OC greater) on Distress and Interference. Table 4 (Appendix A) provides means and SDs for each of the four groups on FOCI—OC and FOCI—DI.

*NEO-PI.* In order to test stated hypotheses regarding the NEO-PI, Explore Descriptives were run. In addition, a MANOVA was performed to test for significant effects of Big Five personality scale scores, as measured by the NEO-PI, on group membership, and other MANOVAs were performed on the subscales of Extraversion, Neuroticism, and Openness. There was a significant effect of group on the combined NEO-PI Big Five scales ( $F(15,235) = 3.151, p < .001$ ; Wilks' Lambda = .603). As hypothesized, there was a statistically significant effect of Neuroticism on group membership ( $F(3,89) = 13.17, p < .001$ ), with AN+OC scoring the highest. However, AN scored the second highest, followed by OC, the reverse of the expected result. Employing the Bonferroni post-hoc test, significant differences were found between AN and C ( $p < .001$ ), OC and C ( $p = .008$ ), and AN+OC and C ( $p < .001$ ) on Neuroticism. Although group means were almost in the expected order on Extraversion (C greatest, followed by OC, AN, and AN+OC), there were no significant differences between the means and no main effect of Extraversion. Similarly, there was no significant main effect for Openness, and no group differences, although the means were ordered in nearly the opposite of the expected ranking (AN highest, followed by AN+OC, OC, and C). Table 5 (Appendix A) provides means and SDs for all four groups on the NEO-PI Big Five personality factors.

T-tests revealed that there were unexpected significant differences between AN and C on Agreeableness ( $t = -2.2$ ,  $df = 44$ ,  $p = .03$ ) and Openness ( $t = 2.5$ ,  $df = 43$ ,  $p = .02$ ), as well as a significant difference between AN+OC and C on Agreeableness ( $t = -2.2$ ,  $df = 35$ ,  $p = .04$ ).

No hypotheses were initially stated regarding the subscales of the NEO-PI, but because of the statistically significant effect of Neuroticism, a MANOVA was performed to test for significant effects of the subscales of Neuroticism, Extraversion, and Openness on group membership. There was a significant effect of group on the combined Neuroticism subscales ( $F(18, 238) = 2.800$ ,  $p < .001$ ; Wilks' Lambda = .581). Within the Neuroticism scale, there were statistically significant effects of group membership on Anxiety ( $F(3,89) = 5.1$ ,  $p = .003$ ), Depression ( $F(3,89) = 14.06$ ,  $p < .001$ ), Self-Consciousness ( $F(3,89) = 10.06$ ,  $p < .001$ ), Impulsivity ( $F(3,89) = 5.87$ ,  $p = .001$ ), and Vulnerability ( $F(3,89) = 8.94$ ,  $p < .001$ ), with AN+OC scoring the highest, followed by AN, OC, and C. A MANOVA performed on the subscales of the Extraversion scale revealed that there was a significant effect of group on the combined Extraversion subscales ( $F(18,235) = 1.807$ ,  $p = .025$ ; Wilks' Lambda = .696). Within the Extraversion scale, there were statistically significant effects of group membership on Warmth ( $F(3,89) = 3.01$ ,  $p = .034$ ) and Gregariousness ( $F(3,89) = 3.64$ ,  $p = .016$ ), with C scoring highest, followed by OC, AN, and AN+OC. A MANOVA performed on the subscales of the Openness scale revealed that there was not a significant effect of group on the combined Openness subscales ( $F(18,238) = 1.471$ ,  $p = .101$  Wilks' Lambda = .742). Within the Openness subscale, however, there was a significant effect of group membership on Openness to Aesthetics ( $F(3,89) = 3.84$ ,  $p = .012$ ), with AN scoring the

highest. Please see Table 17 (Appendix A) for significant group differences revealed by the Bonferroni post-hoc tests.

*BDI and BAI.* An ANOVA was performed to test for significant hypothesized effects of the BDI and BAI on group membership. There was a significant effect for each of these tests (BDI:  $F(3,94) = 15.82, p < .001$ ; BAI:  $F(3,97) = 13.27, p < .001$ ). As expected, AN+OC scored highest on both the BDI and the BAI. However, this group was followed by AN, OC, and then C. Although significant differences between AN and OC were hypothesized, none were apparent ( $p > .10$  for BDI and BAI). Interestingly, employing the Bonferonni post-hoc test, significant differences were found on the BDI between the AN and AN+OC ( $p = .019$ ; AN+OC greater), the AN and C ( $p = .001$ ; AN greater), the OC and AN+OC ( $p < .001$ ; AN+OC greater), the OC and C ( $p = .030$ ; OC greater), and the AN+OC and C ( $p < .001$ ; AN+OC greater). There were significant differences on the BAI between the AN and C groups ( $p < .001$ ; AN greater), the OC and C ( $p = .002$ ; OC greater), and the AN+OC and C ( $p < .001$ ; AN+OC greater). Please see Table 6 (Appendix A) for means and SDs of all groups on both of these tests.

In order to test the hypothesis that there would be significant group effects for some of the vegetative symptoms on the BDI (e.g., fatigue, loss of appetite, sleep problems, loss of energy, etc.), a MANOVA was performed with each BDI item as a variable. There was a significant effect of group on the combined BDI items ( $F(63,222) = 1.805, p = .001, \text{Wilks' Lambda} = .291$ ). There was also a significant effect of group membership on every item except Irritability ( $p = .057$ ), but the most significant differences were between AN+OC and AN ( $p = .005$ ) and AN+OC and OC ( $p = .004$ ) on Loss of Interest, between AN+OC and AN ( $p = .039$ ) on Loss of Energy, and between

AN+OC and AN ( $p = .026$ ) and AN+OC and OC ( $p < .001$ ) on Sleep Problems, supporting the hypothesis that group membership has an effect on severity of vegetative symptoms, with AN+OC consistently reporting the highest levels of difficulty.

*SIAB-S.* A MANOVA was performed to test for significant effects of group membership on the SIAB-S subscales (Body Image and Slimness Ideal [BI], General Psychopathology [GP], Sexuality and Social Integration [SS], Bulimic Symptoms [BS], Inappropriate Compensatory Behaviors [IC], and Atypical Binges [AB]), both at their worst and within the last three months. There was a significant effect of group on the combined SIAB-S subscales ( $F(36,101) = 4.946, p < .001, \text{Wilks' Lambda} = .050$ ). There was a significant effect of group membership for each of these subscales. Table 7 (Appendix A) outlines F- and p-values for each subscale. As expected, AN+OC had the highest scores on BI and GP, and the lowest scores on SS (Table 8 [Appendix A] provides means and SDs for each of the groups on each of the subscales of the SIAB-S). However, contrary to stated hypotheses, AN+OC also had the highest scores on BS, IC, and AB, indicating that these individuals are also exhibiting symptoms of bulimia. As expected, OC did not differ significantly from C on any of these scales (BS, IC, AB). However, they did demonstrate other disordered eating patterns, which can be seen on Table 8 (Appendix A). Most notably, there was a significant difference between OC and C ( $p = .001$ ) on BI—At Worst. Table 16 describes significant differences, as indicated by Bonferonni post-hoc tests, between groups on the SIAB-S subscales.

#### *General Correlations*

Several bivariate correlations were performed to test for hypothesized relations between selected discrete measured variables. Although Inconsistent Discipline (APQ)

did not reliably distinguish between groups, there was a significant negative correlation between Inconsistent Discipline and Conscientiousness ( $r = -.180$ ,  $N = 91$ ,  $p = .044$ ), with 3.2% of the variance explained, and between Inconsistent Discipline and Agreeableness ( $r = -.269$ ,  $N = 91$ ,  $p = .005$ ), with 7.3% of the variance explained. Scores on the EAT correlated strongly with the BDI ( $r = .540$ ,  $N = 95$ ,  $p < .001$ , 29.16% variance), the BAI ( $r = .491$ ,  $N = 97$ ,  $p < .001$ , 24.01% variance) and the subscales of the SIAB-S. Tables 9a and 9b (Appendix A) outline the correlations between the EAT and the SIAB-S subscales (Table 9a denotes “recent” symptoms, and Table 9b denotes symptoms “at worst”).

### *Multiple Regressions*

A multiple regression was performed to test for hypothesized relations between the EAT and the big five personality factors (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness). Using the enter method, a significant model emerged:  $F(5,85) = 7.187$ ,  $p < .001$ . The model explains 29.7% of the variance ( $R^2 = .297$ ). Table 18 (Appendix A) provides information for the predictor variables entered into the model. Neuroticism was a significant predictor ( $p < .001$ ), but the other NEO-PI subscales were not. There were significant positive correlations between scores on the EAT and Neuroticism ( $r = .508$ ,  $N = 91$ ,  $p < .001$ , one-tailed), and the EAT and Openness ( $r = .188$ ,  $N = 91$ ,  $p = .037$ , one-tailed). There were significant negative correlations between the EAT and Agreeableness ( $r = -.277$ ,  $N = 91$ ,  $p = .004$ , one-tailed) and the EAT and Extraversion ( $r = -.249$ ,  $N = 91$ ,  $p = .009$ , one-tailed). The strongest correlation was between EAT and Neuroticism, with 25.8% of the variation explained. The correlation between EAT and Agreeableness is also fairly strong, with 7.7% of the variation explained.

In order to test for relations between the EAT and the subscales of the Big Five personality factors, bivariate correlations were performed between the EAT and the subscales. Tables 10, 11, and 12 (Appendix A) provide data for correlations between the EAT and the subscales of Openness (Table 10), Extraversion (Table 11), and Neuroticism (Table 12). Note particularly the significant correlations between the EAT and Anxiety, Depression, Self-consciousness, Impulsivity, Vulnerability, Warmth, Gregariousness, Positive Emotions, Openness to Fantasy, and Openness to Aesthetics.

As the other major variable that separated participants into group categories was total OCI score, another multiple regression was performed to test for relations between OCI frequency and the same five personality factors. Using the enter method, a significant model again emerged:  $F(5,84) = 3.942, p = .003$ . The model explains 19% of the variance ( $R^2 = .190$ ). Table 19 (Appendix A) provides information for the predictor variables entered into the model. Neuroticism was again a significant predictor ( $p < .001$ ), but the other NEO-PI subscales were not. There was a significant positive correlation between scores on the OCI and Neuroticism ( $r = .399, N = 90, p < .001, \text{one-tailed}$ ). In a parallel multiple regression performed with the FOCI-OC scale (instead of the OCI frequency) and the big five personality scales, only 10.5% of the variance was accounted for by the model.

To further test for relations between the subscales of the Big Five personality factors and the OCI, bivariate correlations were performed with the OCI and the NEO-PI subscales. Tables 13, 14, and 15 (Appendix A) describe correlations between the OCI and the subscales of Openness (Table 13), Extraversion (Table 14), and Neuroticism (Table 15). Note particularly the significant correlations between the OCI and Anxiety, Angry

Hostility, Depression, Self-Consciousness, Impulsivity, Vulnerability, Warmth, Gregariousness, and Openness to Feelings.

### *Discriminant Analysis*

In order to identify which variables discriminated most effectively between the four groups in this study, a discriminant analysis was performed with group membership as the dependent variable and General Psychopathology (recent and “at worst”), Neuroticism, Openness, Agreeableness, Positive Parenting, Corporal Discipline, and Poor Monitoring/Supervision as predictor variables. These variables were selected because they appeared to have a significant impact on group membership. When individuals with at least one missing variable were excluded, 47 cases were analyzed (7 AN, 12 OC, 7 AN+OC, and 21 C).

Univariate ANOVAs revealed that the women in each group differed significantly on Parental Poor Monitoring/Supervision, General Psychopathology (both recent and at their worst), Neuroticism, Agreeableness, and Openness. Three discriminant functions were calculated. The value of the first function was significantly different for the four groups (chi-square = 64.46,  $df = 24$ ,  $p < .001$ ), but the second and third were not (2: chi-square = 19.91,  $df = 14$ ,  $p = .133$ ; 3: chi-square = 4.973,  $df = 6$ ,  $p = .547$ ). The first function discriminated well between the groups (eigenvalue = 1.923, 76.7% of variance), while the second and third contributed less (2: eigenvalue = .453, 18.7% of variance; 3: eigenvalue = .132, 5.3% of variance).

The correlations between predictor variables and the discriminant function suggested that Recent General Psychopathology, Openness, Neuroticism, and Poor Monitoring/Supervision were the best predictors of the first function. Agreeableness,



Corporal Discipline, Positive Parenting, and Recent General Psychopathology were the best predictors of the second function. General Psychopathology at its worst, Corporal Discipline, Recent General Psychopathology, and Poor Monitoring/Supervision were the best predictors of the third function. Overall, the discriminant function successfully predicted group membership for 74.5% of cases, with accurate predictions being made for 71.4% of AN, 50% of OC, 85.7% of AN+OC, and 85.7% of C. This discriminant function appears to be a good model for this data, both in terms of accurate group discrimination and parsimony.

#### IV. DISCUSSION

It is evident that there are significant differences between the four groups (AN+OC, AN, OC, and C) on a number of variables. The questions of interest, however, are whether the initial hypotheses were upheld, what the support or lack thereof may mean, and what might be some of the other unexpected findings from the extensive database. Most importantly, it is hoped that the data can help shed light on the qualitative differences between women/girls who develop anorexic behaviors alone and comorbidly with obsessive-compulsive behaviors, and the differences between those who develop obsessive-compulsive behaviors alone versus comorbidly with anorexic behaviors. This section will further explore the results outlined in the prior section, examining and attempting to explain the results of the tested hypotheses relevant to each measure completed by the participants. Some interactions of different variables, and their possible meaning, will also be discussed, followed by an overall discussion of the major differences between individuals in each of the three non-control groups.

##### *EAT*

The EAT was used in this study to categorize participants into groups, so it clearly had an effect on group membership. Additional hypotheses suggested that AN+OC would have higher scores than AN, as it is assumed (based on the literature with clinical populations) that the addition of obsessive-compulsive behaviors makes anorexic behaviors more pronounced and problematic. Specifically, data from clinical populations emphasizes the lower Body Mass Index (BMI) seen in anorexics with comorbid OCD

(Thiel et al., 1998). In addition, because of the close relationship between obsessions/compulsions and anorexic problems, and the theory that anorexia lies on the obsessive-compulsive spectrum, or perhaps is a subtype of OCD (described in greater detail later), it is expected that OC will be significantly higher than C.

The first hypothesis was not supported; AN+OC had basically the same scores on the EAT as the AN group. However, the OC group did score significantly higher than C on the EAT, supporting the idea that individuals with obsessive-compulsive problems seem to already be on a spectrum with eating problems. This is an important result clinically, as it suggests that women with significant obsessive-compulsive problems should be monitored for the appearance of problematic eating. Anderluh et al. (2003) report that individuals with anorexia have a much higher retrospective rating of OC symptoms than those without anorexia. This result also lends support for the theory that anorexia should be placed on the obsessive-compulsive disorder spectrum, diagnostically. There already exists an extensive literature outlining several proposed “obsessive-compulsive spectrum disorders,” of which anorexia is primary (see Hollander & Benzaquen, 1997, for a review). According to the literature, these two disorders share common neurobiological, psychosocial, and behavioral patterns in affected individuals. This issue is further discussed later.

Scores on the EAT were significantly affected by the personalities of the individuals, as well as personality trends within groups, supporting the extensive literature outlining common personality traits among anorexics. A multiple regression revealed that 25.6% of the variance among the EAT scores was accounted for by personality. Among the Big Five scales (NEO-PI), it appeared that women with the most

significant eating issues had the highest levels of neuroticism and openness, and the lowest levels of agreeableness and extraversion. This result replicates the high levels of neuroticism seen among anorexics in the literature (e.g., Bollen & Wojciechowski, 2004), as well as the low cooperativeness and negative emotionality that consistently appear in anorexic samples (e.g., Cassin & von Ranson, 2005). It seems that the more problematic one's eating behavior, the less friendly and more anxious she appears on the NEO-PI. However, as eating problems increase, individuals appear to be more willing to engage in novel experiences, specifically fantasy (i.e., daydreaming) and aesthetics (i.e., art and beauty). This result does not have a precedent in anorexia literature, and is worthy of further exploration. In fact, at least one other study using the NEO-PI found that anorexics scored significantly lower than controls on Openness (Podar, Jaanisk, Allik, & Harro, 2007). The current results may suggest that women who struggle with eating spend more time fantasizing about what they will eat (or not eat), what they want their bodies to look like, and how they want to look overall. In addition, a focus on one's own aestheticism might increase an appreciation of the aesthetic qualities in the real world. These factors may be affecting the relation between EAT scores and the Openness to Fantasy and Openness to Aesthetics subscales of the NEO-PI.

### *EDI*

The EDI, like the EAT, was used to establish group membership, but the same cut-off for EDI score was used in both the AN and AN+OC groups. Therefore, it was hypothesized that t-tests performed on the subscales of the EDI would serve to highlight significant differences between these two groups, thereby establishing important differences in the types of disordered eating both groups exhibited. Unfortunately,

although AN+OC scored slightly higher than AN on every subscale, there were not any significant differences between the two groups on any subscale or on total score. Eating-related psychopathology appears similar across individuals with and without obsessive-compulsive behaviors.

Regarding the subscales of the EDI, it was hypothesized that AN would score the highest on Drive for Thinness, as this is the primary diagnostic symptom of individuals with anorexic behaviors (see DSM-IV-TR: APA, 2004), and Maturity Fears, as difficulty growing up and separating from mother is a hallmark of pure anorexia (Friedlander & Siegel, 1990). Individuals with anorexia are reportedly more childlike in many of their attributes, demonstrating closer attachments to their parents (particularly their mothers) and exhibiting discomfort with the bodily changes that occur in puberty. Contrary to expectation, however, there was not a significant difference between AN+OC and AN, perhaps indicating that maturity fears are comparable in both groups, and both are motivated to maintain a low BMI. It was also hypothesized that there would not be a significant difference between C, OC, and AN+OC on Bulimia. Instead, the spread followed the pattern established so far: AN+OC highest, followed by AN, OC, and C, indicating that individuals who meet screening criteria for anorexic behaviors also seem to be demonstrating bulimic behaviors.

The hypotheses that AN+OC would score highest on Ineffectiveness, Perfectionism, and Interpersonal Difficulty were all supported, further affirming the clear picture that AN+OC is the most impaired group overall, and that the addition of either anorexic or obsessive-compulsive behaviors to the other generally causes an increase in

severity. Even so, AN+OC scores on these subscales are not significantly higher than AN scores, so the increase in severity is not dramatic.

### *OCI*

It was hypothesized that both the Frequency and Distress scales of the OCI should correlate negatively with NEO-PI Extraversion and Openness. Of course, it was also expected that the two scales would correlate highly with each other. This expectation was supported with an  $r^2$  of 1. Both the scales correlated highly with the FOCI—DI and the FOCI—OC, suggesting that the measures are measuring similar constructs, which was expected. The scales correlated positively with Neuroticism and EDI Perfectionism, but did not have significant correlations with Extraversion or Openness. This indicates that the development of obsessions and compulsions is related to the personality traits of neuroticism and perfectionism, which is supported by the literature (more detailed discussion regarding the literature base is under *FOCI*). Perhaps individuals with high levels of neuroticism and perfectionism are more vulnerable to developing these behaviors. Alternatively, the presence of these behaviors may increase levels of neuroticism and perfectionism. The literature has established the presence of these personality traits in OC individuals, but the sequencing is still unclear. Interestingly, along with the FOCI, the OCI was positively correlated with other subscales of the EDI, potentially as an artifact of the AN+OC group, which automatically includes individuals with high scores on each of the tests.

### *APQ*

The APQ has six subscales: Parental Involvement (PI), Positive Parenting (PP), Poor Monitoring/Supervision (PM), Inconsistent Discipline (ID), Corporal Discipline

(CD), and Other Discipline (OD). Of these subscales, PI, PP, PM, and CD had an effect on group membership, suggesting that the related parenting styles may have helped establish participants' levels of anorexic and obsessive-compulsive behaviors during childhood. Initial hypotheses regarding PI had posited that the AN and AN+OC groups would report the highest levels. This hypothesis was based on the theory of Expressed Emotion (EE; Brown & Rutter, 1966), which, when applied to families of anorexic patients, suggests that eating-disordered individuals have highly enmeshed parents and family systems, who are overly involved in most aspects of the eating disordered girls' lives. Authors believe that individuals with high levels of EE in their families develop eating issues as an attempt to establish control over some aspect of their lives. Furthermore, other research (e.g. Shoebridge & Gowers, 2000) has supported this notion by indicating that "high-concern" parents are more likely to have children who develop anorexia. However, this hypothesis was not upheld. In fact, the control group had the highest scores on PI, followed by the OC, AN, and AN+OC.

The only significant difference on PI existed between the C and AN+OC, suggesting that, contrary to the literature, parents of young women without anorexic or obsessive-compulsive behaviors are much more involved in their children's lives than parents of AN+OC individuals. It appears that the parents of the AN+OC individuals were the least involved. Parental involvement, as well as positive parenting style (also highest among controls), could possibly be a protective factor against both obsessive-compulsive and anorexic behaviors, potentially because involved parents are more likely to recognize problematic behaviors developing and attempt to prevent them from becoming severe. These results either indicate that PI, as measured by the APQ, is not a

good analogue for measurement of EE (emphasizing the positive qualities associated with parental involvement), or suggest that EE may not, as the literature suggests, be more present in the families of individuals with anorexic behaviors than in other families.

The second hypothesis regarding the APQ posited that AN+OC would have the highest levels of reported PM. This hypothesis was supported; AN+OC had significantly higher levels than any of the other groups, followed by AN, OC, and C. Significant differences existed only between AN+OC and each of the other groups. It may be that individuals who have a predilection toward anorexic or obsessive-compulsive problems, and are not monitored and/or supervised appropriately while growing up, are implicitly given “space” to follow through with some of their maladaptive behaviors. Individuals with the highest levels of monitoring and supervision (C) did not, for the most part, develop unhealthy eating or OC behaviors. Alternatively, individuals who were not receiving regular supervision may have been drawn toward destructive anorexic or obsessive-compulsive behaviors in a semi-conscious effort to attract the attention of their parents. It is possible that individuals with anorexic behaviors may have developed obsessive-compulsive behaviors while their parents were not supervising them, whereas those with obsessive-compulsive behaviors may have developed anorexic behaviors under similar conditions. Parents with more stringent monitoring policies would have been more likely to identify and perhaps prevent the behaviors before they multiplied. Interestingly, some research (e.g., Poser, 2005) describes the improved eating styles that occur under the strict supervision of hospital care. When not replicated at home, these improvements are sometimes lost.



A third APQ-related hypothesis suggested that those with the highest scores on ID would have the highest scores on subjectively negative personality traits (Neuroticism and subscales), and the lowest scores on subjectively positive personality traits (Extraversion and Openness with their subscales, Agreeableness, and Conscientiousness). Furthermore, because of the association between inconsistent parenting styles and bulimia (Scalf-McIver & Thompson, 1989), it was hypothesized that ID would correlate positively with SIAB Bulimic Symptoms, Inappropriate Compensatory Behaviors, and Atypical Binges; and EDI Bulimia. According to the literature, bulimia is perpetuated by parents who fluctuate between strict requirements/high expectations and neglect (e.g., Minuchin, Rosman, & Baker, 1978). Contrary to expectations, ID did not have a significant effect on group membership, and only a few of these hypotheses were supported.

ID correlated positively with self-reported Bulimia and Atypical Binges at their worst, as well as recent and at worst Inappropriate Compensatory Behaviors on the SIAB, as expected, and negatively with a few of the expected personality measures: Angry Hostility, Openness to Ideas, Warmth, Agreeableness, and Conscientiousness. These maladaptive personality traits could be a result of difficulty predicting others' responses. Without the secure and consistent expectations established by consistent discipline from one's parents, it is likely more difficult to develop easy and warm relationships with other people. The literature on outcomes of parenting styles is limited; however, some research appears to support the idea that inconsistency and uninvolved leads to poorer outcome on behalf of the children, particularly in adolescence (Simons & Conger, 2007).

In the current study, there were also correlations with Perfectionism, Interpersonal Distrust, and Maturity Fears (EDI subscales). Again, there is not a precedent for this result in the literature. However, it is possible that with a background of inconsistent parenting, individuals may be more likely to feel the need for perfection (Simons & Conger, 2007; Scalf-McIver & Thompson, 1989); perfectionism could have been developed as an attempt to please parents who were difficult to predict. At the same time, because the initial bonds of trust in childhood are formed with parents, those who have inconsistent parents may have difficulty forming trust with their parents or other significant people throughout their lives. It also seems that having inconsistent discipline as children could develop into an inability to establish one's own sense of right and wrong in adulthood (Maturity Fears, low Conscientiousness).

Because the primary question of this study is how to differentiate between individuals who develop AN, OC, or AN and OC behaviors, t-tests were used to look at the parenting differences between AN and AN+OC groups, and between OC and AN+OC groups. It appears that the AN+OC groups reported higher levels of Corporal Discipline and Poor Monitoring/Supervision, and lower levels of Positive Parenting than AN. The AN+OC group reported higher levels of Other Discipline and Poor Monitoring/Supervision and lower levels of Positive Parenting and Parental Involvement than OC groups. It seems that parenting style plays a significant role in how vulnerable individuals develop psychopathology. A positive parenting style seems to protect individuals from the most severe comorbidities, and parental involvement in children's lives also seems to be a protective factor (Berk, 2005; Salem-Pickartz & Donnelly, 2007; Valiente & Eisenberg, 2006). A lack of monitoring and/or supervision appears to open

the door to more severe psychopathology for individuals who already exhibit behavioral problems, while the use of alternative or corporal punishments also increases the chances for greater severity of behavioral problems.

### *FOCI*

It was hypothesized that scores on the FOCI would correlate positively with EDI Perfectionism and Neuroticism, and negatively with Openness. First, it was important to establish that FOCI Total Obsessions and Compulsions (OC) correlated with FOCI Distress and Interference (DI), which it did ( $p < .001$ ). It also correlated strongly ( $p < .001$ ) with both the Frequency and Distress scores of the OCI. The FOCI—OC did correlate positively with Neuroticism, but no correlation was found with Openness. This suggests that individuals who suffer from high levels of obsessive-compulsive behaviors are more likely to be generally neurotic, but do not seem to have any trend in terms of openness to experience. Specifically, individuals scoring high on the FOCI—OC have higher levels of anxiety, angry hostility, depression, impulsivity, vulnerability, and self-consciousness (five of the six subscales of NEO-PI Neuroticism). Most of these relations make intuitive sense for individuals who are chronically obsessive and/or compulsive, and the result is supported by the OCD literature. Rector, Richter, and Bagby (2005) summarize the high prevalence of neuroticism among individuals with OCD, while Fullana et al. (2004) highlight the lower scores on extraversion among OCD patients (although not among subclinical individuals). It is surprising that obsessive-compulsive individuals would also be scoring relatively high on Impulsivity, but other studies do not appear to parse out the subscales of the NEO-PI, so it is unclear whether or not this is a new finding. Perhaps obsessive-compulsive behaviors are occasionally countered in OC

individuals by impulsive behaviors. Alternatively, obsessive-compulsive individuals might view “normal” behaviors as more impulsive than others would, skewing the results of this self-report survey.

Although FOCI—OC did not correlate with Perfectionism, it did correlate with several other EDI subscales, including Drive for Thinness, Bulimia, Interpersonal Distrust, Maturity Fears, and Interoceptive Awareness. Some of these correlations were initially surprising, but make sense in light of the finding that the OC group had higher scores than C on the EAT. This supports the overall hypothesis that anorexic and obsessive-compulsive behaviors fall on a common spectrum. Although this correlation is at least partially driven by the presence of the AN+OC group, which by definition includes only participants who exhibit both behaviors, the effect sizes are high enough to suggest that these behaviors are present even in some of the OC individuals. The fact that Perfectionism did not correlate with FOCI—OC is somewhat surprising, considering the literature base emphasizing perfectionism as a hallmark of obsessive-compulsive behavior (Tozzi, Jacobson, Neale, Kendler, & Bulik, 2004). Perhaps the types of obsessions and compulsions most exhibited by this sample were of a different quality than the symmetry and ordering often seen by perfectionistic obsessive-compulsive individuals.

As indicated, the FOCI—DI is highly correlated with the FOCI—OC, so many of their correlations are in common. For example, the FOCI—DI is also highly positively correlated with Neuroticism. It was hypothesized that FOCI—DI would correlate negatively with Openness, and positively with EDI Ineffectiveness and SIAB—General Psychopathology. None of these hypotheses were supported except the correlation

between FOCI—DI and SIAB—GP, both recent and at worst. The correlations between FOCI—DI and SIAB—GP (recent and at its worst) were very large, accounting for 38.1% of the variance in GP during the worst AN episode, and 43.6% of the variance in recent GP. It appears that the data surrounding the FOCI seems to be supporting the general hypothesis that psychopathology begets psychopathology.

### *NEO-PI*

It was hypothesized that on the NEO-PI, the AN+OC group would have the highest mean scores on Neuroticism (due to their greater overall psychopathology), followed by OC (assuming that common anxiety will correlate the two), and then AN; all three groups would have higher levels than the C. This hypothesis was partially supported, in that the AN+OC scored the highest (a similar relation was discussed regarding the correlation between EAT scores and Neuroticism), but it was followed by AN, OC, and then C. The only significant differences separated each group from C, suggesting that at a certain level, neuroticism becomes associated with psychopathology. At a pathological level, this personality trait can correlate with a variety of neurotic problems, and is not limited to anorexic or obsessive-compulsive behaviors.

In order to look for qualitative differences between the neuroticism of each of the three groups, an exploration of the subscales was undertaken. Anxiety, Depression, Self-Consciousness, Impulsivity, and Vulnerability all had an effect on group membership. On every subscale, AN+OC had the highest level, followed by AN, OC, and C. AN+OC and AN both exhibited significantly more anxiety, vulnerability, and impulsivity than the controls, but not more than the other groups, suggesting that individuals with eating issues have higher levels of these three traits (as measured by the NEO-PI) than those

with OC behaviors or no measured OC or anorexic behaviors. This result is surprising considering the literature supporting the presence of neuroticism in individuals with OCD.

Anxiety, vulnerability, and impulsivity do not serve to separate the three non-control groups. However, depression serves as a cutting point between the controls and non-controls, as there was no distinction in scores between the three non-control groups, but significant differences between each group and the controls. This signifies that depression as a personality trait is present across all non-control groups, perhaps impacted by the other measured psychopathological behaviors. However, scores on the BDI (discussed later) indicated that the types of depression differ between all four groups, with AN+OC having the most vegetative qualities. The significant difference between levels of self-consciousness on AN+OC and OC suggests that self-consciousness may be a trait that places women with OC behaviors at risk for developing maladaptive eating habits. The literature supports the notion that self-consciousness is elevated among eating-disordered individuals, compared to controls (e.g., Forbush & Watson, 2006), but future studies will have to identify whether this puts OC individuals at particular risk for developing eating issues. Consistent with the literature, AN+OC and AN both had more self-consciousness than controls.

On the Extraversion scale of the NEO-PI, it was hypothesized that C would score highest, followed by OC, AN+OC, and AN. The actual order of the four groups was: C, OC, AN, AN+OC, further supporting the notion that AN+OC is consistently more impaired than any of the other groups. Although Extraversion did not have a significant effect on group membership, there was a significant difference between the mean scores

of AN+OC and C on two of its subscales: Warmth and Gregariousness. On both of these subscales, C scored higher, suggesting that the presence of anorexic and obsessive-compulsive behaviors may be limiting individuals' abilities to be warm, caring, and outgoing. Alternatively, perhaps individuals with initially lower levels of warmth and gregariousness are more at risk for developing anorexic and/or obsessive-compulsive problems. According to the literature on Expressed Emotion in anorexic families, the parents of anorexic individuals are lacking in warmth (Szmukler et al., 1987), which limits anorexic individuals' chances to have a good model of warm personality traits.

Regarding the Openness scale of the NEO-PI, it was hypothesized that C would score highest, followed by OC, AN+OC, and AN. There was a significant difference between AN and C on Openness to Aesthetics. As noted above, scores on the EAT were positively correlated with Openness to Aesthetics, so it appears that awareness of worldly beauty is a trait characteristic of eating-disordered individuals (at least in this study). It is likely that these individuals are more concerned with outward appearance than others (i.e., high emphasis on body image, etc.), and this may be transferring into appreciating/admiring the aesthetic qualities of external items. Openness to Aesthetics is primarily associated with an appreciation of art and beauty, such as music, ballet, poetry, and visual arts. This may be a trait common among individuals with anorexic behaviors, but not yet robustly upheld in the literature.

On the Agreeableness scale of the NEO-PI, it was hypothesized that C would score highest, followed by OC, AN+OC, and AN. This hypothesis was based primarily on the literature indicating that mood is worsened by food deprivation (Laessle, Schweiger, & Pirke, 1988). However, none of these differences were significant.

On the Conscientiousness scale of the NEO-PI, it was hypothesized that AN+OC would score highest, followed by OC, AN, and C. It was assumed that the sense of responsibility often associated with OC behaviors (Salkovskis & Forrester, 2002) might translate into higher levels of this particular personality trait. After all, feeling that one is responsible for important aspects of one's life would naturally heighten one's sense of conscientiousness. However, this hypothesis was not supported, as Conscientiousness did not have a significant effect on group membership, and none of the differences between groups were significant.

### *BAI*

Initially, it was hypothesized that AN+OC would evidence the most anxiety on the BAI, followed by the OC group, and then the AN. Further hypotheses suggested that C would have the least anxiety, and that a significant difference would exist between OC and AN. All three of the non-control groups had significantly more anxiety than the controls, so that hypothesis was supported. However, while AN+OC had the highest scores on the BAI, there was essentially no difference in level of anxiety between AN and OC (Bonferroni  $p > .10$ ). Furthermore, although the ANOVA indicated that the BAI did have a meaningful effect on group membership, it was clear that the primary distinction was between the controls and the non-controls (AN+OC, OC, and AN). It appears that in terms of anxiety (as measured by the BAI), there is a level at which any combination of significant anorexic behaviors and/or obsessive-compulsive behaviors separates individuals from those without similar concerns and behaviors. This anxiety is very likely resulting from participants' symptoms and related concerns. Diagnosable anorexia and OCD are very often comorbid with (other) anxiety disorders (Hudson, Hiripi, Pope, &



Kessler, 2007; Ginsberg, 2004), and whether individuals experience the symptoms at a diagnosable level seems irrelevant in terms of distinguishing them from those without these behaviors. What remains unanswered in this study is whether or not individuals with psychopathology generally unrelated to anxiety (i.e., Attention-Deficit Disorders, Sleep Disorders) experience state anxiety at levels comparable to those in the study.

Although it was expected that OC would have generally higher levels of anxiety than AN, it appears that the anxiety associated with anorexic behaviors (not a classified anxiety disorder) is as severe and significant as the anxiety associated with obsessive-compulsive behaviors (an anxiety disorder at diagnostic levels). This may be an important finding in terms of treating anorexia, as more emphasis may need to be placed on reduction of anxiety, even when explicit obsessive-compulsive symptoms are not present. It is probably safe to assume that the quality of the anxiety is different between these two groups, but no item-to-item analysis was performed on the BAI, as many of the symptoms fall into the same category (mostly physiological). In a treatment setting, a thorough assessment could establish which symptoms of anxiety were causing distress and/or interference for eating-disordered individuals. The literature questions whether anorexia and OCD may actually fall on the same spectrum, in terms of anorexia being an eating- and food-based form of OCD (Bastiani et al., 1996). The comparable levels of state anxiety between these two groups seems to support this hypothesis. If the theory attracts more support, results like this may begin to inform treatment planning of individuals with anorexia. OCD has well-established empirically-based treatments, while anorexia continues to be treatment-resistant. Perhaps similar treatment modalities (i.e. exposure and response prevention) could be effectively used with anorexic patients.

Although the AN+OC group did demonstrate the most anxiety of any of the groups, there was not a significant difference between this group and the other non-controls. Perhaps the symptoms (anorexic or obsessive-compulsive behaviors) are as anxiety-inducing individually as they are in combination. However, the combination of the two symptom groups does appear in tandem with increased problems in other areas measured by this study, which will be discussed further.

### *BDI*

The initial hypothesis regarding the BDI was that AN+OC would have the highest self-reported levels of depression. In addition, it was predicted that AN would have significantly higher levels of depression than OC. Finally, differences in reported symptoms would likely be present, specifically that AN (and possibly AN+OC) would have more loss of energy, tiredness, etc., resulting from the malnourishment associated with chronic under-eating.

As hypothesized, AN+OC did report more symptoms of depression than the other groups. In fact, they had significantly higher scores than any of the other groups. Because AN+OC had significantly higher BDI scores than either the AN or the OC groups, it is reasonable to assume that the addition of obsessive-compulsive behaviors to an individual struggling with anorexic behaviors, OR the addition of anorexic behaviors to an individual struggling with obsessive-compulsive behaviors, is significantly depressing. However, it is also possible that those individuals with higher initial levels of depression may be more vulnerable to additional symptoms. It is certain that the combination of these behaviors leads to higher reported depression than the presence of either behavior cluster individually. Relevant literature suggests that clinical samples struggling with

both OCD and anorexia also experience higher levels of depression (e.g., Srinivisigam et al., 1995), so these results support the notion that this depressiveness becomes pronounced in individuals at less pathological stages in their disorders.

All three of the non-control groups had significantly higher BDI scores than the control group, which indicates that depressive symptoms parallel other psychopathology. That is, as non-depressive psychopathology increases, the chance of having more depressive symptoms increases. Furthermore, it appears that anorexic or obsessive-compulsive behaviors may set the stage for depressive psychopathology, which is also suggested by the literature. Several studies have noted depressive symptoms and diagnosable depression in individuals with either OCD or anorexia (Bulik, Berkman, & Brownley, 2007; Kennedy, McVey, & Katz, 1990; Smart, Beumont, & George, 1976). In fact, one review (Bardone-Cone, Wonderluh, and Frank, 2007) indicated that perfectionism seems to be a common personality trait linking both OCD and anorexia with depression. It is impossible, of course, to say whether depression was present before or after the other symptoms in this study, but it is certainly true that it is an important aspect of either of these disorders. Some individuals in clinical circles believe that depression is generally a secondary disorder, brought about by distressing symptoms of other Axis I or Axis II disorders, which may support the notion that the depressive symptoms reported by these women followed the onset of obsessive-compulsive and/or anorexic behaviors. Unfortunately, inability to distinguish sequence of symptomatology prevents any enlightenment on this subject.

Just as with scores on the BAI, there was almost no difference between scores on the BDI for AN and OC (Bonferroni  $p > .10$ ). This suggests that anorexic behaviors and

obsessive-compulsive behaviors are approximately equally depressing for college-age women. However, differences did exist between AN and OC regarding which symptoms of depression were most often reported. Most striking, AN reported significantly higher levels of self-dislike ( $p = .001$ ) than the OC group. It could be that eating issues lead to or are brought about by feelings of dislike toward oneself, while OC behaviors lead to or are brought about by other depressive symptoms. The literature indicates that girls and women with low self-esteem are at a higher risk of developing eating disorders, perhaps partly in an attempt to increase their positive feelings toward themselves (Striegel-Moore, Franko, & Thompson, 2004). Unfortunately, the result of developing anorexia is generally quite the opposite, and struggling individuals continue to suffer from low feelings of self-worth unless treatment also focuses on improving these feelings. The results of at least one study (Surgenor, Maguire, & Russell, 2007) successfully raised “self-liking” in girls that were effectively treated for anorexia, and adult recovered anorexics in another study had levels of self-esteem similar to women with no history of eating disorders (Halvorson & Heyerdahl, 2006). The results of the current study reinforce the theory that these individuals are vulnerable, and also seem to suggest that associated weight loss does not assist in raising one’s self-image. Again, treatment planners should take into consideration the often comorbid presence of depressive symptoms when treating AN or OC individuals. They should specifically tackle the likely presence, and potential origins, of self-dislike in individuals with anorexic behaviors, as it appears that self-esteem fluctuates inversely with the presence of eating restriction (i.e. self-esteem increases as restriction decreases).

Item differences were also apparent between AN+OC and OC, and between AN+OC and AN. AN+OC reported significantly higher levels than OC of Sadness, Pessimism, Punishment Feelings, Self-Dislike, Suicidal Thinking, Crying, Agitation, Loss of Interest, Worthlessness, Sleep Problems, and Tiredness. AN+OC had significantly higher levels than AN on Punishment Feelings, Suicidal Thinking, Crying, Agitation, Loss of Interest, Loss of Energy, Sleep Problems, and Tiredness. The concordance of these behaviors certainly increases the severity of the depression, but there also seems to be a qualitative difference between the groups. Women with both anorexic and obsessive-compulsive behaviors demonstrated more feelings of being punished, more suicidal thinking, more crying, more agitation, more loss of interest, more sleep problems, and more tiredness than those with just one behavior or the other. This seems to be painting the picture of a woman who is quite withdrawn, exhausted, and in distress, relative to her counterparts with only anorexic or obsessive-compulsive behaviors.

While the starvation literature might suggest that the malnutrition associated with anorexic behaviors could very likely drive this type of more vegetative depression (e.g., Franklin et al., 1948), the current study indicates that these symptoms differentiate between those with anorexia with and without comorbid OCD, so it is not simply the presence or absence of malnutrition that is significant. Perhaps struggling with the symptoms of two disorders instead of just one has a significantly taxing effect, manifesting in these more severe vegetative symptoms. Although there exists at least one study looking at “types” of depression related to OCD subtypes (Tynes & Winstead, 1999), few studies have utilized the individual items of the BDI to establish qualitative

differences, so little information exists in the literature regarding qualitatively different depressions. The AN and OC groups seem to be more similar to each other than to the AN+OC group, suggesting that the combination of the two generates a wholly distinct type of depression. Notably, the OC group did not have significantly higher scores than AN+OC or AN on any individual item of the BDI.

Thus far, it seems that a consistent finding is that the AN+OC group has the most ancillary psychopathology. It may be that this is resulting from the common clustering of psychopathology, as the literature demonstrates that those with existing psychopathology are those at highest risk of developing more psychopathology (Thiel et al., 1998).

#### *SIAB-S*

Although the lack of differences between AN and AN+OC on a variety of measures did not greatly enlighten the question of how these groups qualitatively differ from each other, the SIAB-S was used, somewhat more successfully, for this purpose. On the SIAB, the AN+OC group scored significantly higher than AN on General Psychopathology (both recent and at worst) and Sexuality and Social Integration—at worst. The difference between the two groups on GP is not surprising, as the AN+OC group has more psychopathology by definition. However, the higher scores on Sexuality and Social Integration are more surprising. It appears that AN+OC individuals have an easier time adjusting to their own sexual changes, and fitting in with peer groups, than their AN counterparts. Anorexic behaviors alone may be more of a hindrance to the development of healthy social interactions, or obsessive-compulsive behaviors may actually somehow ease the process of transitioning and integrating for otherwise eating-

disordered women and girls. At this time, no literature exists to help clarify these surprising findings.

#### *Data Models*

Discriminant analysis revealed that the combined effect of General Psychopathology, as measured by the SIAB, Neuroticism, Openness, Agreeableness, Positive Parenting, Corporal Punishment, and Poor Monitoring/Supervision effectively predicted group membership for three quarters of the participants in this study. This indicates that these variables are likely risk factors or protective factors for developing these specific types of psychopathology. This analysis confirmed the tests that were run prior, indicating that individuals with low levels of general psychopathology, neuroticism, and parental corporal punishment, and high levels of openness, agreeableness, positive parenting, and supervision as children, are relatively protected from the onset of anorexic or obsessive-compulsive behaviors, or both. Conversely, individuals with high levels of general psychopathology, neuroticism, and parental corporal punishment, and low levels of openness, agreeableness, positive parenting, and supervision as children, are at risk for developing anorexic or obsessive-compulsive behaviors, or both. It is likely that general psychopathology may develop along with the problematic behaviors, and also possible that parenting styles may be interacting with the distressing behaviors of the young women. However, personality literature suggests that personality traits might be serving as the main risk factors for developing these behaviors (Casper, Hedeker, & McClough, 1992), as personality develops early in childhood (Calkins & Hill, 2007; Fabes, Gaertner, & Popp, 2006; Ronald, Happe, & Hughes, 2005; Rothbart, Posner, & Kieras, 2006). Parents and therapists should take note of these

personality traits in childhood, in order to monitor for the onset of troubling behaviors. Furthermore, parents can use more positive parenting techniques, less corporal punishment, and more responsible supervision styles to help protect their daughters from developing either obsessive-compulsive or anorexic behaviors.

It should be noted that a relatively small percentage (56.62%) of the participants were actually included in the discriminant analysis. This was a consequence of individuals not completing every questionnaire in the study. Participants completed the surveys online, and whereas some completed every question of every study, many did not. Interestingly, of the 24 individuals who met criteria for the AN group, only 7 (29.17%) actually completed the rest of the surveys in the study. Of the 18 in the AN+OC group, another 7 (38.89%) completed the surveys. In the OC group, 12 of 20 (60%) completed the surveys, while 100% (21/21) of the women in the C group completed the surveys. These data are striking, and they may suggest that women with anorexic and/or obsessive-compulsive behaviors felt threatened by the presence of questions that clearly assessed for these problems. Those with anorexic behaviors (with or without obsessions/compulsions) were responding at the lowest rates. In fact, one individual in the AN group wrote in a response blank, "I do not have an eating disorder!" This indicates possible resistance to assessment and/or treatment of eating problems. These data further suggest that the participants who did complete all the surveys were those with the least resistance, and possibly those with the least severe behaviors. It is possible that the results of this study would have been magnified if those participants who dropped out had actually completed all of the questions.

### *Overall Conclusions*



The primary question that this author sought to answer when planning this study was: How do individuals with anorexic behaviors or obsessive-compulsive behaviors differ from individuals with anorexic and obsessive-compulsive behaviors? Having just reviewed some of the most significant findings from this study in the context of the current literature, this section seeks to answer this primary question.

Basically, individuals who develop anorexic AND obsessive-compulsive behaviors are more impaired than those who have just one problem or the other. For example, these individuals score higher on measures of depression, anxiety, general psychopathology, personality deficits, and social impairment. In addition, they also report more significant history of poor parenting, including lack of involvement, poor monitoring/supervision, lack of positive parenting, and corporal discipline.

It is impossible to answer the question of which behaviors preceded others, or which behaviors were caused by others. However, in order to draw some tentative conclusions, I will hereby make the gross generalization that personality develops early and is affected by parenting, which affects psychopathology. This generalization is based on the assumptions that temperament is primarily innate (e.g., Kagan & Snidman, 2004), the main effects of parenting are created in childhood (e.g., Sternberg, Lamb, & Guterman, 2006), and psychopathology is primarily a result of temperament and environment (Clark, 2005). Based on these assumptions, I will first outline the primary differences between individuals who develop anorexic behaviors and those who develop both anorexic and obsessive-compulsive behaviors.

*AN versus AN+OC.* Individuals with personalities that have high levels of appreciation for art and beauty, perfectionism, trait anxiety, self-consciousness,

impulsivity, and vulnerability, and low levels of warmth, gregariousness, positive emotions, and agreeableness seem to be at higher risk than others of developing problematic eating behaviors. However, the only one of these traits that approaches significance ( $p = .058$ ) in distinguishing between those with anorexic behaviors and those who also develop obsessive-compulsive behaviors is gregariousness, suggesting that those with significantly less gregariousness are slightly more likely to also experience obsessive-compulsive behaviors.

Certain parenting styles are also associated with the development of anorexic behaviors. Individuals with parents who exhibit low levels of parental involvement and positive parenting and high levels of poor monitoring/supervision are more likely than others to develop anorexic behaviors. Of these individuals, those with especially low levels of positive parenting, especially high levels of poor monitoring/supervision, and/or the presence of corporal punishment are at risk of also experiencing obsessive-compulsive behaviors.

Finally, different psychopathology is associated with individuals who develop anorexic behaviors alone or comorbidly with obsessive-compulsive behaviors. This psychopathology is likely developing as a result of personality, parenting style, and other, non-measured factors. It interacts with the development and manifestation of anorexic and obsessive-compulsive behaviors. Individuals with anorexic behaviors are reporting high levels of state anxiety, state depression, general psychopathology, bulimic symptoms, and difficulty with sexuality and social integration. Of these individuals, those who also develop obsessive-compulsive behaviors are more likely to experience high levels of state depression and general psychopathology (at worst and recent). Notably, the

depression is not only more severe in those with ancillary obsessive-compulsive behaviors, it is also of a different quality, including more punishment feelings, suicidal thinking, crying, agitation, loss of interest, loss of energy, sleep problems, and tiredness.

Therefore, individuals who develop obsessive-compulsive behaviors comorbidly with anorexic behaviors differ from their purely eating-disordered counterparts by being slightly less gregarious and having parents who use fewer positive parenting techniques, less supervision, and corporal punishment. In addition, these individuals have higher levels of general psychopathology than only eating-disordered individuals, and exhibit a more severe depression which appears more fatiguing than that of their counterparts.

*OC versus AN+OC.* Individuals with personalities that have high levels of perfectionism, trait anxiety, angry hostility, trait depression, self-consciousness, impulsivity, vulnerability, and openness to feelings, and low levels of warmth and gregariousness seem to be at higher risk than others of developing obsessive-compulsive behaviors. Of these individuals, those who have particularly high levels of perfectionism, trait depression, self-consciousness, and vulnerability, and particularly low levels of gregariousness are more likely to also experience anorexic behaviors.

Certain parenting styles are also associated with the development of obsessive-compulsive behaviors. Individuals with parents who exhibit low levels of parental involvement and positive parenting and high levels of poor monitoring/supervision and corporal punishment are more likely than others to develop obsessive-compulsive behaviors. Of these individuals, those with especially low levels of parental involvement and positive parenting, and especially high levels of poor monitoring/supervision and/or the presence of “other” discipline, are at risk of also experiencing anorexic behaviors.

Finally, different psychopathology is associated with individuals who develop obsessive-compulsive behaviors alone or comorbidly with anorexic behaviors. This psychopathology likely develops as a result of personality, parenting style, and other, non-measured factors. It interacts with the development and manifestation of anorexic and obsessive-compulsive behaviors. Individuals with obsessive-compulsive behaviors are reporting high levels of state anxiety, state depression, general psychopathology, and difficulty with sexuality and social integration. Of these individuals, those who also develop anorexic behaviors are more likely to experience higher levels of state depression, state anxiety, bulimic symptoms, difficulty with sexuality and social integration (at worst and recent), and general psychopathology (at worst and recent). Again, the depression is not only more severe in those with ancillary anorexic behaviors, it is also of a different quality, including more sadness, pessimism, punishment feelings, self-dislike, suicidal thinking, crying, agitation, loss of interest, worthlessness, sleep problems, and tiredness.

Therefore, individuals who develop obsessive-compulsive behaviors comorbidly with anorexic behaviors differ from their purely obsessive-compulsive counterparts by being more perfectionistic, self-conscious, vulnerable, and depressive, and less gregarious. They have parents that are less involved, use fewer positive parenting techniques, less supervision, and different forms of discipline than OC individuals. Finally, they have higher levels of general psychopathology, state anxiety, and bulimic symptoms, more difficulty with sexuality and social integration, and exhibit a more severe depression which appears more fatiguing than that of their counterparts.

#### *Limitations and Future Research*

Although this study appears to be one of the first of its kind to look at comorbid anorexia and OCD in non-clinical populations, the author fell short of the intended goal to use collateral information to broaden the findings. Future researchers will want to use creative methods to persuade mothers of participants to contribute to the research base, as collateral data would help confirm or disconfirm participants' self-reported information. Furthermore, it would provide insight from another perspective on the parenting style of these individuals' caregivers. Finally, it would help researchers understand if young women with anorexic or OC behaviors have an accurate (judged by agreement with their equally subjective mothers) memory of their past behaviors.

It is notable that far fewer participants completed the longer questionnaires (e.g., SIAB-S, NEO-PI) included in this study than did the shorter surveys (e.g., BAI, BDI). The data identified the fact that far more eating-disordered individuals than non omitted the SIAB-S (with revealing eating-related questions), and while that information is interesting from a theoretical perspective, it is unhelpful in terms of data analysis and statistical power. Perhaps presenting the SIAB-S independent of the other questionnaires would encourage participants to complete it, although it would extend the number of times participants have to go online and fill something out. Alternatively, participants could fill out the questionnaires in person, with a proctor present to ensure completion prior to receipt of the extra credit voucher. Future researchers using the SIAB-S should consider these and other methods, such as presenting the SIAB-S first, rather than after several other, shorter (less detailed) questionnaires.

Finally, this study attempted to identify primarily individuals with anorexic behaviors by using screening measures that generally select individuals with such

behaviors. Unfortunately, some of the results (e.g., high numbers of participants with high scores on Bulimic Symptoms [SIAB-S] and Bulimia [EDI] indicate that some individuals with bulimic behaviors may have met criteria and been included in the database, therefore skewing somewhat the analyses.

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## APPENDICES

APPENDIX A

TABLES

Table 1.

*Eating Attitudes Test (EAT): Means and Standard Deviations by Group*

Group	N	Mean	Standard Deviation
AN	45	41.72 <sub>a</sub>	11.64
OC	36	13.32 <sub>b</sub>	6.57
AN+OC	27	42.04 <sub>a</sub>	10.15
C	27	8.04 <sub>c</sub>	6.10

Note. Means with different subscripts differ significantly from each other ( $p < .05$ ).

Table 2.

*Eating Disorder Inventory (EDI): Means and Standard Deviations by Group*

Group	N	Mean	Standard Deviation
AN	45	68.68 <sub>a</sub>	24.27
OC	36	25.85 <sub>b</sub>	9.69
AN+OC	27	73.59 <sub>a</sub>	23.06
C	27	15.10 <sub>c</sub>	14.74

Note. Means with different subscripts differ significantly from each other ( $p < .05$ ).

Table 3.

*Eating Disorder Inventory (EDI) Subscales: Means and Standard Deviations by group*

Subscale	M (and SD) for group			
	AN	OC	AN+OC	C
Body Dissatisfaction	9.98(4.02) <sub>a</sub>	4.06(2.25) <sub>b</sub>	11.07(4.74) <sub>a</sub>	2.53(2.71) <sub>b</sub>
Ineffectiveness	11.68(4.18) <sub>a</sub>	3.80(2.24) <sub>b</sub>	12.07(3.62) <sub>a</sub>	2.23(2.61) <sub>b</sub>
Perfectionism	4.82(3.61) <sub>a</sub>	1.06(1.27) <sub>b</sub>	5.11(3.72) <sub>a</sub>	.86(1.34) <sub>b</sub>
Interpersonal Distress	8.74(3.05) <sub>a</sub>	3.45(1.97) <sub>b</sub>	9.37(3.35) <sub>a</sub>	2.20(1.96) <sub>b</sub>
Interceptive Awareness	8.75(4.77) <sub>a</sub>	2.89(1.98) <sub>b</sub>	9.44(4.60) <sub>a</sub>	1.47(2.01) <sub>b</sub>
Maturity Fears	11.30(3.74) <sub>a</sub>	3.90(2.13) <sub>b</sub>	11.44(3.50) <sub>a</sub>	2.02(2.67) <sub>b</sub>

Note. Means with different subscripts differ significantly from each other ( $p < .01$ ).

Table 4.

*Florida Obsessive-Compulsive Inventory (FOCI): Means and Standard Deviations by group*

Subscale	M (and SD) for group			
	AN	OC	AN+OC	C
Obsessions and Compulsions	12.08(3.89)	14.19(6.19) <sub>a</sub>	15.06(4.71) <sub>a</sub>	10.41(2.56) <sub>b</sub>
Distress and Interferences	2.42(2.83) <sub>a</sub>	5.67(4.03) <sub>b</sub>	6.56(4.06) <sub>b</sub>	.59(1.62) <sub>c</sub>

Note. Means with different subscripts differ significantly from each other ( $p < .05$ ).

Table 5.

*NEO Personality Inventory (NEO-PI): Means and Standard Deviations by group*

Big Five Trait	M (and SD) for group			
	AN	OC	AN+OC	C
Neuroticism	159.65(23.72) <sub>a</sub>	148.14(24.71) <sub>a</sub>	168.56(17.39) <sub>a</sub>	127.68(17.20) <sub>b</sub>
Extraversion	159.81(17.38) <sub>a</sub>	165.05(14.18) <sub>a</sub>	157.22(21.58) <sub>a</sub>	168.64(18.17) <sub>b</sub>
Openness	162.65(19.49) <sub>a</sub>	159.81(16.49) <sub>a</sub>	161.78(18.23) <sub>a</sub>	151.18(12.42) <sub>b</sub>
Agreeableness	51.42(8.38) <sub>a</sub>	54.29(5.59) <sub>a</sub>	51.06(7.89) <sub>a</sub>	56.00(5.98) <sub>b</sub>
Conscientiousness	62.04(10.13) <sub>a</sub>	66.81(7.00) <sub>a</sub>	65.06(10.37) <sub>a</sub>	65.77(7.00) <sub>b</sub>

Note. Means with different subscripts differ significantly from each other ( $p < .05$ ).

Table 6.

*Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI): Means and Standard Deviations by group*

Inventory	M (and SD) for group			
	AN	OC	AN+OC	C
BDI	16.12(10.56) <sub>a</sub>	13.00(9.95) <sub>a</sub>	24.95(11.82) <sub>b</sub>	5.31(6.34) <sub>c</sub>
BAI	35.42(7.90) <sub>a</sub>	33.85(10.52) <sub>a</sub>	40.00(10.09) <sub>a</sub>	26.11(4.55) <sub>b</sub>

Note. Means with different subscripts differ significantly from each other ( $p < .05$ ).

Table 7.

*Structured Interview for Anorexia and Bulimia—Self-Report (SIAB-S) Subscales: ANOVA F- and p-values*

Subscale	F	p
Body Image and Slimness Ideal—Recent	33.18	<.001
Body Image and Slimness Ideal—At Worst	16.79	<.001
General Psychopathology—Recent	17.94	<.001
General Psychopathology—At Worst	15.27	<.001
Sexuality/Social Integration—Recent	8.93	<.001
Sexuality/Social Integration—At Worst	8.85	<.001
Bulimic Symptoms—Recent	8.69	<.001
Bulimic Symptoms—At Worst	10.44	<.001
Inappropriate Compensatory Bx—Recent	12.24	<.001
Inappropriate Compensatory Bx—At Worst	17.58	<.001
Atypical Binges—Recent	5.07	.004
Atypical Binges—At Worst	6.64	.001



Table 8.

*Structured Interview for Anorexia and Bulimia—Self-Report (SIAB—S): Subscale Means and Standard Deviations by group*

Subscale	M (and SD) for group			
	AN	OC	AN+OC	C
Body Image and Slimness Ideal—Recent	1.58(.43)	.87(.37)	1.61(.55)	.40(.21)
Body Image and Slimness Ideal—At Worst	1.46(.74)	1.00(.58)	1.97(.75)	.49(.28)
General Psychopathology—Recent	.61(.48)	.85(.53)	1.54(.68)	.23(.20)
General Psychopathology—At Worst	1.04(.55)	1.10(.70)	2.14(.93)	.43(.42)
Sexuality/Social Integration—Recent	.63(.51)	.46(.34)	1.14(.68)	.25(.28)
Sexuality/Social Integration—At Worst	.55(.46)	.68(.76)	1.59(.98)	.28(.36)
Bulimic Symptoms—Recent	1.13(.67)	.41(.48)	1.42(.87)	.37(.47)
Bulimic Symptoms—At Worst	1.00(.91)	.44(.51)	1.94(1.17)	.38(.49)
Inappropriate Compensatory Bx—Recent	.70(.36)	.15(.25)	.66(.65)	.05(.10)
Inappropriate Compensatory Bx—At Worst	.75(.52)	.26(.38)	1.25(.74)	.08(.15)
Atypical Binges—Recent	.66(.55)	.46(.50)	.91(.65)	.21(.28)
Atypical Binges—At Worst	1.03(.99)	.54(.55)	1.40(.69)	.35(.44)

Table 9a.

*Correlations between EAT total and SIAB-S [“Recent”] subscales (N = 49)*

	Pearson’s Correlations and (p-values)						
	EAT	BI	GP	SS	BS	IC	AB
EAT	1.0	.840*	.594*	.581*	.544*	.733*	.423*
Total		(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(.001)

Note. Correlations marked with an asterisk (\*) denote significance (p<.01).

Table 9b.

*Correlations between EAT total and SIAB-S [“At Worst”] subscales (N = 49)*

	Pearson’s Correlations and (p-values)						
	EAT	BI	GP	SS	BS	IC	AB
EAT	1.0	.753*	.641*	.498*	.556*	.772*	.547*
Total		(<.001)	(<.001)	(<.001)	(<.001)	(<.001)	(<.001)

Note. Correlations marked with an asterisk (\*) denote significance (p<.01).

Table 10.

*Correlations between EAT total and NEO-PI Openness subscales (N = 93)*

	Pearson's Correlations and (p-values)						
	EAT Total	Openness to Fantasy	Openness to Aesthetics	Openness to Feelings	Openness to Activities	Openness to Ideas	Openness to Values
EAT Total	1.0	.201*	.325**	.051	-.154	.108	-.004
		(.027)	(.001)	(.313)	(.071)	(.151)	(.485)

Note. Correlations marked with an asterisk (\*) denote significance ( $p < .05$ ). Two asterisks (\*\*) denote significance at a  $p < .01$  level.

Table 11.

*Correlations between EAT total and NEO-PI Extraversion subscales (N = 93)*

	Pearson's Correlations and (p-values)						
	EAT Total	Warmth	Gregariousness	Assertiveness	Activity	Excitement Seeking	Positive Emotions
EAT Total	1.0	-.302*	-.262*	-.164	.159	-.029	-.243*
		(.002)	(.006)	(.058)	(.064)	(.390)	(.009)

Note. Correlations marked with an asterisk (\*) denote significance ( $p < .01$ ).

Table 12.

*Correlations between EAT total and NEO-PI Neuroticism subscales (N = 93)*

	Pearson's Correlations and (p-values)						
	EAT Total	Anxiety	Angry Hostility	Depression	Self-Consciousness	Impulsivity	Vulnerability
EAT Total	1.0	.328*	.153	.507*	.476*	.336*	.433*
		(.001)	(.072)	(<.001)	(<.001)	(<.001)	(<.001)

Note. Correlations marked with an asterisk (\*) denote significance ( $p < .01$ ).

Table 13.

*Correlations between OCI—Frequency and NEO-PI Openness subscales (N = 93)*

	Pearson's Correlations and (p-values)						
	OCI Frequency	Openness to Fantasy	Openness to Aesthetics	Openness to Feelings	Openness to Activities	Openness to Ideas	Openness to Values
OCI Freq.	1.0	.009	.138	.207*	-.067	.127	.030
		(.466)	(.094)	(.023)	(.263)	(.113)	(.389)

Note. Correlations marked with an asterisk (\*) denote significance ( $p < .05$ ).

Table 14.

*Correlations between OCI—Frequency and NEO-PI Extraversion subscales (N = 93)*

		<u>Pearson's Correlations and (p-values)</u>					
	OCI Frequency	Warmth	Gregariousness	Assertiveness	Activity	Excitement Seeking	Positive Emotions
OCI	1.0	-.201*	-.306**	.147	.132	-.041	-.083
Freq.		(.037)	(.001)	(.080)	(.103)	(.350)	(.215)

*Note.* Correlations marked with an asterisk (\*) denote significance ( $p < .05$ ).  
Two asterisks (\*\*) denote significance at a  $p < .01$  level.

Table 15.

*Correlations between OCI—Frequency and NEO-PI Neuroticism subscales (N = 93)*

		<u>Pearson's Correlations and (p-values)</u>					
	OCI Frequency	Anxiety	Angry Hostility	Depression	Self- Consciousness	Impulsivity	Vulnerability
OCI	1.0	.342*	.279*	.373*	.217*	.261*	.275*
Freq.		(<.001)	(.003)	(<.001)	(.018)	(.006)	(.004)

*Note.* Correlations marked with an asterisk (\*) denote significance ( $p < .01$ ).

Table 16.

*Structured Interview for Anorexia and Bulimia—Self-Report (SIAB—S): Significant differences between groups by subscale*

Subscale	Significant differences between group means (p-value)
Body Image and Slimness Ideal— Recent	AN>OC (.001); AN>C (<.001); AN+OC>OC (<.001); OC>C (.005); AN+OC>C (0)
Body Image and Slimness Ideal— At Worst	AN>C (.001); AN+OC>OC (.002); AN+OC>C (<.001)
General Psychopathology—Recent	AN+OC>AN (.001); AN+OC>OC (.007); OC>C (.002); AN+OC>C (<.001)
General Psychopathology— At Worst	AN+OC>AN (.005); AN+OC>OC (<.001); OC>C (.026); AN+OC>C (<.001)
Sexuality/Social Integration— Recent	AN+OC>OC (.006); AN+OC>C (<.001)
Sexuality/Social Integration— At Worst	AN+OC>AN (.009); AN+OC>OC (.013); AN+OC>C (<.001)
Bulimic Symptoms—Recent	AN>C (.018); AN+OC>OC (.003); AN+OC>C (<.001)
Bulimic Symptoms—At Worst	AN+OC>OC (<.001); AN+OC>C (<.001)
Inappropriate Compensatory Bx— Recent	AN>OC (.004); AN>C (<.001); AN+OC>OC (.008)
Inappropriate Compensatory Bx— At Worst	AN>OC (.002); AN+OC>OC (<.001); AN+OC>C (<.001)
Atypical Binges—Recent	AN+OC>C (.004)
Atypical Binges—At Worst	AN+OC>OC (.024); AN+OC>C (.001)

Table 17.

*NEO Personality Inventory (NEO-PI): Significant differences between groups by subscale*

Subscale	Significant differences between group means (p-value)
Anxiety	AN>C (.007); AN+OC>C (.006)
Depression	AN >C (<.001); AN+OC>OC (.031); OC>C (.013); AN+OC>C (<.001)
Self-Consciousness	AN >C (<.001); AN+OC>OC (.035); AN+OC>C (<.001)
Impulsivity	AN+OC>C (.003); AN>C (.003)
Vulnerability	AN+OC>C (<.001); AN >C (.001);
Warmth	C>AN+OC (.027)
Gregariousness	C>AN+OC (.010)
Assertiveness	No significant differences
Activity	No significant differences
Excitement-seeking	No significant differences
Positive Emotions	No significant differences
Openness to Fantasy	No significant differences
Openness to Aesthetics	AN>C (.015); AN+OC>C (.054)*
Openness to Feelings	No significant differences
Openness to Activities	No significant differences
Openness to Ideas	No significant differences
Openness to Values	No significant differences

Note: Values marked with an asterisk (\*) indicate a trend toward significance ( $p < .06$ ).

Table 18.

*Unstandardized and standardized regression coefficients for NEO-PI variables entered into the model (to predict EAT scores)*

Variable	B	SE B	$\beta$
Neuroticism	.344	.082	.469*
Extraversion	-.032	.108	-.032
Openness	.169	.106	.154
Agreeableness	-.356	.269	-.140
Conscientiousness	.289	.211	.141

Note. Values marked with an asterisk (\*) denote significance ( $p < .001$ ).

Table 19.

*Unstandardized and standardized regression coefficients for NEO-PI variables entered into the model (to predict OCI scores)*

Variable	B	SE B	$\beta$
Neuroticism	1.048	.275	.462*
Extraversion	.171	.355	.056
Openness	.291	.350	.087
Agreeableness	-.350	.889	-.045
Conscientiousness	1.082	.701	.173

*Note.* Values marked with an asterisk (\*) denote significance ( $p < .001$ ).

APPENDIX B  
RECRUITMENT FLYER

# Extra Credit Opportunity!

Receive one hour of extra credit for filling out surveys online.

This is a psychology research project conducted by Amanda Mulfinger (mulfiam@auburn.edu) and F. Dudley McGlynn (mcglyfd@auburn.edu). Please email them with any questions.

**Who: Females 19 and older**

**What: Extra credit for study looking at eating and other behaviors**

**When: At YOUR convenience!**

**Where: Anywhere!**

Please go to the following website and receive extra credit from the comfort of your own home:

<https://fp.auburn.edu/mulfiam>



APPENDIX C  
LETTER TO MOTHERS

Dear Mrs. Xxxx,

My name is Amanda Mulfinger, and I am a doctoral candidate in clinical psychology at Auburn University. Your daughter recently completed some surveys to provide research data for my doctoral dissertation, and to receive extra credit for one of her classes. I was hoping that you would be willing to provide some information for my project as well. Filling out the surveys is very easy, and should not take much time. If you would please go to the following website:

<https://fp.auburn.edu/mulfiam/parents.htm>

you will be asked to electronically sign an informed consent form, and then will be walked through the process of filling out surveys. In addition, one of my research assistants or myself would like to contact you by telephone to ask you just a few more questions, which will not take more than ten or 15 minutes. If you could reply to this email with your phone number and a good time to reach you, I would appreciate it.

This information will provide valuable research results for the field of psychology, and may eventually be used to help individuals who suffer from mental illness. Again, all you need to do is fill out the surveys at the above website and respond to this email with your phone number.

Thank you very much.

Sincerely,

Amanda Mulfinger, M.S.  
Auburn University

APPENDIX D  
INFORMED CONSENT

**INFORMED CONSENT**  
**for a Research Study Entitled**  
**---Dietary Restriction and Obsessions/Compulsions---**

You are invited to participate in a research study investigating the interaction of dietary restriction and other symptoms characteristic of eating issues and obsessions and compulsions. This study is being conducted by Amanda Mulfinger, M.S., under the supervision of F. Dudley McGlynn, Ph.D. We hope to learn how problematic eating and/or food issues interact with obsessiveness and/or compulsiveness, as well as other behaviors. We are interested in both childhood and current behaviors. You were selected as a possible participant because you are a female undergraduate at least 19 years old.

If you decide to participate, we will ask you to fill out, as honestly as possible, several simple questionnaires today, which should take between 30 and 60 minutes. You will receive one hour's worth of extra credit for your participation. In addition, you may be invited to return for a second appointment to fill out more extensive surveys, which will take approximately an hour. If this happens, you will receive another hour's worth of extra credit. At that time, you will be asked to consent for the researchers to briefly contact your primary caregiver via email and/or telephone. If you agree, you will receive one more hour's worth of extra credit. In total, you can receive up to three hours' worth of extra credit during the course of this study.

It is possible that some of the questions asked during the surveys will make you slightly uncomfortable. If that happens, you are under no obligation to complete the survey. In addition, you may inform the researcher that you need help and he or she will contact a licensed psychologist with whom you can speak. In addition, you will receive a list of referrals upon completion of the packet. Finally, if you are uncomfortable with having a researcher contact your primary caregiver, you are under no obligation to consent, and she or her will not be contacted.

It is also possible that some of the questions on the surveys will encourage you, indirectly, to undergo some self-exploration that may benefit you. We cannot promise you that you will receive any or all of the benefits described. You will also receive up to three hours of extra credit as direct compensation for your time participating in this study. In addition, the information that you and other participants provide will provide valuable information about the relationships between several behaviors that are typical of female undergraduate students.

If some of the issues presented in this study are distressing for you, it is possible that you could benefit from psychotherapy to target eating issues or obsessiveness and compulsiveness. It is important for you to know, however, that this is a RESEARCH project—not a treatment for your possible condition. Furthermore, participation in this study does not suggest in any way that you have any conditions for which treatment would be necessary.

Any information obtained in connection with this study and that can be identified with you will remain confidential. Your name will be separated from the data and coded in a

different location with the participant number that will be written on your data. The data and the code list will be kept in separate locked filing cabinets in a locked room. Information collected through your participation may be used to fulfill an educational requirement (the doctoral dissertation of the primary investigator), published in a professional journal, and/or presented at a professional meeting, etc. If so, none of your identifiable information will be included.

The data and code list with your identifying information will be kept for up to two years, until completion of the educational requirements listed above. At that time, all data and code lists will be destroyed. You may withdraw from participation at any time, without penalty, and you may withdraw any data which has been collected from you, as long as that data is identifiable.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University or the department of psychology.

If you have any questions we invite you to ask them now. If you have questions later, Amanda Mulfinger, M. S. (mulfiam@auburn.edu, 334-844-3714) or F. Dudley McGlynn, Ph.D. (mcglyfd@auburn.edu, 334-844-6472) will be happy to answer them. You will be provided a copy of this form to keep.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

**HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.**

\_\_\_\_\_  
Participant's signature                      Date

\_\_\_\_\_  
Investigator obtaining consent                      Date

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name