

CLINICAL IMPLICATIONS OF DISORDERED EATING ATTITUDES AND
BEHAVIORS IN COLLEGE WOMEN

by

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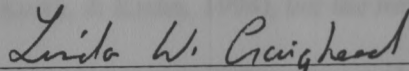
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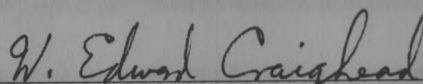
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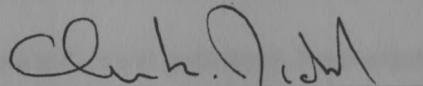
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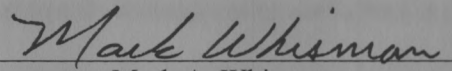
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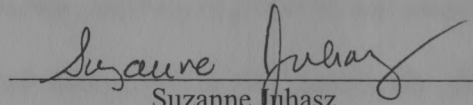
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Clinical Implications of Disordered Eating Attitudes and Behaviors in College Women
Thesis directed by Professor Linda W. Craighead

Disordered eating attitudes and behaviors are prevalent among college age women (Drewnowski, Yee, Kurth, & Krahn, 1994), but the impact of specific domains of eating pathology on young women's lives has not been adequately studied. This study examined the relationships among domains of eating disordered symptomatology and measures of general psychopathology and quality of life in a nonclinical sample of female college students. One-hundred and six women representing the range of eating disorder pathology, from asymptomatic to subthreshold eating disorders, were selected based on a survey sent to freshman women. Results indicated that disordered eating attitudes (i.e., body dissatisfaction, overconcern with eating, weight, and shape, and preoccupation with eating, weight, and shape), dietary restriction, and bingeing were all associated with increased general psychopathology and decreased quality of life. Specifically, disordered eating attitudes, dietary restriction, and bingeing predicted increased negative affect and anxiety, and decreased general satisfaction. In addition, disordered eating attitudes and bingeing predicted decreased interpersonal competence. Bingeing was the only predictor of increased substance use. An examination of the unique prediction of each domain of disordered eating revealed that bingeing predicted increased substance use above and beyond dietary restriction and disordered eating attitudes, and disordered eating attitudes predicted increased negative affect and anxiety and decreased general

satisfaction over and above dietary restriction and bingeing. These relationships between eating disordered symptomatology and general psychopathology/quality of life were generally linear with the exception of the relationship between dietary restriction and general satisfaction. When controlling for disordered eating attitudes and bingeing, this relationship was nonlinear such that at below average levels of dietary restriction, increased restriction was associated with increased general satisfaction, but at above average levels of dietary restriction, increased restriction was associated with decreased general satisfaction. Findings stress the importance of intervening with women experiencing subthreshold disordered eating attitudes and behaviors to minimize the negative impact of such eating disorder pathology on the lives of young women.

Dedication

I would like to thank Dr. Linda Campbell for her support and guidance throughout the course of this project.

To my husband, Jason:

A patient and loving man without whom the completion of this project would not have been possible

To my Uncle John:

A gentle and kind man who first inspired my educational aspirations and has truly been the wind beneath my wings

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Introduction

Clinically diagnosable eating disorders affect 4% of women in the general population [American Psychiatric Association (APA), 2000]. However, subthreshold levels of disordered eating behaviors (e.g., bingeing, purging, strict dieting) and attitudes (e.g., overconcern with eating, weight, and shape, body dissatisfaction, preoccupation with eating, weight, and shape) are much more common (Shisslak, Crago, & Estes, 1995). Estimates of the prevalence of disordered eating behaviors (bingeing and purging) among female college students have ranged from 10% (Heatherton, Nichols, Mahamedi, & Keel, 1995) to 29% (Drewnowski et al., 1994), and 80% of women report dieting during their first year of college (Striegel-Moore, Silberstein, Grunberg, & Rodin, 1990). Disordered eating attitudes have been shown to be even more prevalent. Raudenbush and Zellner (1997) found that 88% of college women who perceive themselves to be normal weight desire to be thinner.

Subthreshold Disordered Eating as a Risk Factor for Full-Syndrome Eating Disorders

The majority of the research regarding subthreshold disordered eating has been done with adolescent girls (ages 12-17 years); such studies have been designed to investigate the possibility that these girls may be at particular risk for the development of full-syndrome eating disorders. However, results of these studies indicate that the vast majority of girls with disordered eating will not develop a full-syndrome disorder (Killen et al. 1994, 1996; Patton, Johnson-Sabine, Mann, & Wakeling, 1990). Similar results have been found in samples of college women. For example, Drewnowski et al. (1994) found that only 4% of the women who displayed

restrictive dieting and binge eating (with no purging behaviors) at the beginning of their freshman year of college met full criteria for bulimia nervosa (BN) by the end of their freshman year. Similarly, disordered eating classification (ranging from non-dieter to full-syndrome eating disorder) remains stable across the transition from high school to college (Vohs, Heatherton, & Herrin, 2001), again suggesting that most women who display disordered eating will not escalate into full-syndrome eating disorders.

Clinical Implications of Subthreshold Disordered Eating

Though disordered eating does lead to full-syndrome eating disorders in a small percentage of young women, it is clear that the majority of young women displaying subthreshold symptomatology will not develop a clinical eating disorder. By the same token, the majority of women experience “normative discontent” regarding weight and shape (Rodin, Silberstein, & Striegel-Moore, 1984), and “normal” eating for many women is characterized by dieting (Polivy & Herman, 1987). The high prevalence of weight and shape concerns and dieting among women has led to the continuity hypothesis of disordered eating. First proposed by Nylander (1971) and expanded by Rodin et al., the continuity hypothesis posits that full-syndrome eating disorders exist at the extreme endpoint on a continuum of disordered eating attitudes and behaviors among young women (Scarano & Kalodner-Martin, 1994). Disordered eating is hypothesized to be quantitatively, but not qualitatively, different from full-syndrome eating disorders. An important question is whether subthreshold disordered eating attitudes and behaviors are associated with general subjective distress and decreased quality of life? If so, intervention with women at subthreshold

levels of disordered eating may be justified to reduce life impairment, not just to prevent escalation to full-syndrome eating disorders.

Treatment-Seeking Samples

Research on the implications of subthreshold disordered eating symptoms has been done with both treatment-seeking and non-treatment-seeking samples. In studies using treatment-seeking populations, findings regarding the clinical implications of partial-syndrome (as opposed to full-syndrome) eating disorders have varied depending on the specific eating disorder. Two studies using only treatment-seeking participants found no differences between those with full-syndrome anorexia nervosa (AN) and those with subthreshold AN in either eating disorder specific psychopathology or general psychopathology (Bunnell, Shenker, Nussbaum, Jacobson, & Cooper, 1990; Martin, Williamson, & Thaw, 2000). With regard to BN, Bunnell et al. found that those who met full criteria for BN were more depressed and psychologically distressed than those with subthreshold BN, whereas Martin et al. failed to find differences between subthreshold and full-syndrome BN groups on depressive symptomatology. Findings with binge eating disorder (BED) are also mixed; Martin et al. found no differences between full-syndrome and partial-syndrome groups on measures of depression, whereas Antony, Johnson, Carr-Nangle, and Abel (1994) found elevated levels of anxiety and depression among those meeting full criteria for BED as compared to those with subthreshold BED.

Although studies using treatment-seeking samples have generally found that partial-syndrome disordered eating is associated with significant psychological

distress, the use of patient samples may be biased as they are inherently more likely to be experiencing distress (Striegel-Moore et al., 2000). Because clinic-based samples may differ from community-based samples (Fairburn, Welch, Norman, O'Connor, & Doll, 1996) and studies have found that a small proportion of those with disordered eating actually seek treatment (Flament, Ledoux, Jeammet, Choquet, & Simon, 1995), it follows that subthreshold disordered eating among non-treatment-seeking samples needs to be examined.

Non-Treatment-Seeking Samples

Much of the research that has been done on the clinical implications of subthreshold disordered eating in non-treatment-seeking samples has examined subthreshold bulimic symptomatology in large-scale samples of high school students. It is evident that even in non-treatment-seeking girls, subthreshold BN symptomatology is associated with psychological maladjustment. Specifically, the disordered eating behaviors of bingeing and/or purging have been associated with increased affective disturbance (e.g., anxiety, depression, emotionality, lower self-esteem), and alcohol and drug use (Killen et al., 1987; Stice, Killen, Hayward, & Taylor, 1998). In addition, in a community sample of adult women, women displaying subthreshold bulimic behaviors reported more conflictual relationships and higher dissatisfaction with work or school and life in general than did a comparison group (Garfinkel et al., 1995).

As the majority of research in this area has focused on bingeing and purging behaviors when examining subthreshold symptomatology, the implications of dietary

restriction are less clear. Steiger, Puentes-Neuman, and Leung (1991) found that those adolescent girls who binged and were underweight (indicating high levels of restriction) were the most depressed of all of the disordered eating subgroups. However, in a sample of Israeli adolescent girls, Stein et al. (1997) found that those classified as partial-syndrome anorectics did not differ from normal controls on measures of depression, obsessionality, or impulsivity. Further research is needed to establish the specific implications of dietary restriction. Some researchers have suggested that dietary restriction may be less problematic than binge eating in terms of associated distress because it is thought to be consistent with the dieter's goals of weight loss, making it ego-syntonic (Mazure, Halmi, Sunday, & Romano, 1994).

Likewise, very little research has specifically examined the implications of disordered eating attitudes (e.g., overconcern with eating, weight, and shape, body dissatisfaction, preoccupation with eating, weight and shape). One large-scale epidemiological study used actual weight and desired weight as indices of body dissatisfaction and desire to lose weight in a community sample of adult women (Kishchuk, Gagnon, Belisle, & Laurendeau, 1992). They found that those participants who were of normal weight, but whose desired weight was below normal (body mass index < 18.7), reported experiencing more psychiatric distress (including more depression, lower sense of general well-being, and fewer social relationships) than those whose desired weight was in the normal range. In addition, this group was more likely to have considered suicide. Because the study did not assess disordered eating behaviors directly, the level of symptomatology in the sample is unclear.

However, the finding that below normal desired weight alone was associated with serious symptomatology in terms of mood disturbance, social functioning, and even suicidality suggests that even attitudes associated with eating disorders may have significant implications for life functioning.

The importance of disordered eating attitudes has been supported in a sample of college women. Niemeier, Pung, Elder, and Craighead (2002) found that lower desired weight at the beginning of freshman year predicted increased psychiatric distress across the first year of college. In this sample, the disordered eating behaviors (i.e., dietary restriction and bingeing) did not predict increased psychiatric distress, again suggesting that the impact of attitudes, regardless of behaviors, may be substantial.

Implications of Subthreshold Disordered Eating in Female College Students

Very few studies have directly examined the implications of subthreshold disordered eating in college students, despite its high prevalence in this population. With the exception of Niemeier et al. (2002) noted above, the two studies that have examined college student populations have studied subthreshold bulimic behaviors specifically (i.e., they have not investigated dietary restriction or disordered eating attitudes). The findings with regard to bulimic behaviors provide preliminary evidence that the relationship between subthreshold BN and psychological distress that has been established for high school girls continues in college.

Franko and Omori (1999) studied a sample of unselected female college freshmen using the self-report Eating Pathology Scale (Drewnowski et al., 1994) to

classify participants as probable bulimic, at-risk dieters, intensive dieters, casual dieters, and non-dieters, based on their level of bingeing and compensatory behaviors. Results showed that probable bulimics and at-risk dieters did not differ on any measures of eating pathology or depression, so they were combined for all analyses. Combined, probable bulimics and at-risk dieters reported not only more dysfunctional weight-related thoughts and disturbed eating attitudes, but also higher levels of depression than the other groups. Scores on all measures followed a downward progression from probable bulimic/at-risk dieter to intensive dieters, casual dieters and non-dieters. This study not only provides support for the continuum hypothesis of disordered eating, but also indicates that those reporting disordered eating behaviors in college report more depressive symptomatology than those who do not. However, the study did not assess several other correlates of subthreshold disordered eating that have been reported among younger girls, notably substance abuse, anxiety, and affective distress (Gross & Rosen, 1988; Killen et al., 1987; Stice et al., 1998). In addition, the study only assessed bingeing and compensatory behaviors, and did not assess dietary restriction or attitudes associated with disordered eating.

In another investigation of college women, Peñas Lledó and Waller (2001) studied a sample of Spanish undergraduate women with no history of psychological treatment, and found that bulimic attitudes and behaviors were associated with alcohol and substance use and self-harming behaviors (including thoughts and impulses about self-mutilation; suicidal thoughts and impulses; and actual self-mutilation).

Significance of Current Research

This study further examined the implications of disordered eating symptomatology in college women. To date, most research on the implications of subthreshold disordered eating has focused on bingeing and the use of compensatory behaviors; very few studies have examined the implications of dietary restriction and disordered eating attitudes (i.e., overconcern with eating, weight, and shape, preoccupation with eating, weight, and shape, and body dissatisfaction). Even though overconcern with weight and shape and body dissatisfaction are often considered “normal” among young women, the clinical implications of these attitudes are not well understood. Therefore, this study assessed the four domains of eating disordered symptomatology separately (bingeing, compensatory behaviors, dietary restriction, and attitudes associated with eating disorders), and evaluated the relationship between each domain and measures of general psychopathology and quality of life.

In addition, studies done with American college students thus far have only assessed depressive symptomatology. This study also assessed the relationship between disordered eating and other areas of psychopathology known to be associated with disordered eating in high school students; anxiety and substance use. The findings of Garfinkel et al. (1995) and Kishchuk et al. (1992) suggest that in addition to their association with psychopathology, disordered eating attitudes and behaviors may be related to more general quality of life domains such as interpersonal relationships and overall well-being. Therefore, this study also examined the

relationship between disordered eating attitudes and behaviors and quality of life by assessing interpersonal competence, stress, self-esteem, and life satisfaction.

Research examining the implications of subthreshold disordered eating to date has several limitations that were addressed. With the exception of Stice et al. (1998), this research has relied on self-report instruments to assess disordered eating symptomatology. However, many investigators stress the need for clinical interviews to diagnose full-syndrome eating disorders (Fairburn & Beglin, 1990), and some suggest that this is also true for subthreshold syndromes (Dancyger & Garfinkel, 1995). Self-report assessment of binge eating is particularly problematic, as self-report has been shown to overestimate the frequency of bingeing as compared to interview data (Fairburn & Beglin, 1994). Therefore, this study used a structured interview [the Eating Disorder Examination (Fairburn & Cooper, 1993)] to supplement self-reports in the assessment of eating disordered behaviors.

Researchers examining disordered eating not meeting full DSM-IV-TR criteria for an eating disorder have used a variety of terms (including subsyndromal, subclinical, partial syndrome, and eating disorder not otherwise specified) and definitions. For example "subclinical BN" has been defined as any bingeing or compensatory behaviors (Stice et al., 1998) to bingeing at least once a week (Garfinkel et al., 1995). As there are no empirically-derived criteria for what constitutes subthreshold symptomatology, researchers have often artificially implemented cut-off points when determining whom to consider "subthreshold," and these cut-off points have varied from study to study. The practice of dichotomizing quantitative variables

has been shown to have negative consequences statistically, including loss of information about individual differences and loss of power (MacCallum, Zhang, Preacher, & Rucker, 2002). Therefore, the variables in this study were assessed and analyzed as continuous data.

In addition, even though there is considerable overlap in the DSM-IV-TR criteria for AN, BN, and the proposed BED, researchers have often grouped symptoms arbitrarily to distinguish among the three disorders at the subthreshold level. For example, although bingeing can be a symptom of all three disorders, any frequency of bingeing has been labeled as subthreshold BN without regard to body weight or presence of compensatory behaviors (e.g., Gross & Rosen, 1988; Killen et al., 1987). As there is no empirical basis to separate the behaviors into “partial-syndrome” disorders, in this study the domains of disordered eating symptomatology (bingeing, compensatory behaviors, dietary restriction, and disordered eating attitudes) were assessed continuously and individually rather than classified as part of only one disorder. The assessment of each domain of disordered eating symptomatology allowed for an examination of their relative association with each area of general psychopathology and quality of life.

Specific Aims

First Specific Aim. First, the study sought to examine whether specific domains of eating disordered symptomatology (bingeing, compensatory behaviors, dietary restriction, and disordered eating attitudes) were associated with areas of

general psychopathology and quality of life in a nonclinical sample of first-year, female college students.

Hypothesis 1a. Findings with non-treatment-seeking adolescent girls suggest that bingeing and/or the use of compensatory behaviors is associated with general psychopathology, specifically depression (Killen et al., 1987; Stice et al., 1998), substance use (Killen et al., 1987), and anxiety (generalized and social; Gross & Rosen, 1988; Stice et al., 1998). In addition, such behaviors have been associated with impaired social and interpersonal functioning, including more conflictual relationships and higher dissatisfaction with work or school and life in general (Garfinkel et al., 1995). Based on these findings, we hypothesized that both bingeing and compensatory behaviors would be associated with depression, substance use, and anxiety. We also hypothesized that both bingeing and compensatory behaviors would be associated with impairments in quality of life domains including low interpersonal competence, high subjective stress, low self-esteem, and low life satisfaction.

Hypothesis 1b. In the few studies that have examined the implications of subthreshold AN, dietary restriction has been shown to be associated with depression (Steiger et al., 1991) and psychiatric distress (Bunnell et al., 1990). We hypothesized that restriction would be associated with depression and anxiety, but not substance use. In addition, restriction was hypothesized to be associated with impairments in the quality of life domains.

Hypothesis 1c. As very little research has examined the implications of disordered eating attitudes, we also examined the associations between overconcern

with eating, weight, and shape, body dissatisfaction, and preoccupation with eating, weight, and shape and general psychopathology and quality of life. Based on findings by Kishchuk et al. (1992) and Niemeier et al. (2002), we predicted that disordered eating attitudes would be associated with anxiety and depression, but not substance use. In addition, disordered eating attitudes were hypothesized to be associated with decreased quality of life.

Second Specific Aim. The second aim of this study was to examine whether the nature of the relationships between the eating disordered symptomatology domains and areas of general psychopathology and quality of life changed depending on the level of eating disordered symptom in a nonclinical sample. The continuity hypothesis would suggest that the effect of disordered eating symptomatology would be linear in nature such that as eating disordered symptoms increase, associated distress and disruptions in life functioning increase.

Hypothesis 2. In line with the continuity hypothesis, we predicted that the nature of the relationship between each domain of eating disordered symptomatology and general psychopathology and quality of life would be linear in nature such that with increases in disordered eating attitudes and behaviors, general psychopathology would increase and quality of life would decrease in a linear fashion. Therefore, we predicted that the relationship between the disordered eating symptoms and the domains of general psychopathology and quality of life would not depend on the level of disordered eating symptom (i.e., there would not be evidence for a nonlinear relationship).

Third Specific Aim. Third, the study aimed to explore whether specific domains of eating disordered symptomatology predicted specific domains of general psychopathology and quality of life above and beyond the others (e.g., does any one eating disorder domain uniquely predict substance use?).

Hypothesis 3. This study aim was considered exploratory in nature due to the lack of previous research examining the relative importance of specific domains of eating disordered symptomatology in impacting other areas of psychological distress. However, based on findings regarding the strong association between bingeing and compensatory behaviors and depression, anxiety, and substance use, we hypothesized that these behaviors would predict all areas of general psychopathology above and beyond dietary restriction and disordered eating attitudes. In addition, bingeing and compensatory behaviors were hypothesized to predict quality of life above and beyond dietary restriction and disordered eating attitudes.

Method

Recruitment

All first-semester, female students were sent a screening survey that included the 26-item version of the Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). The EAT-26 has been extensively used as a screen for maladaptive eating attitudes and behaviors in both adolescent and adult populations (Carter & Moss, 1985; Dancyger & Garfinkel, 1995; Steiger et al., 1991; Stein et al., 1997), and has been shown to have excellent psychometric properties (Gross, Rosen, Leitenberg, & Willmuth, 1986; Williamson, Cubic, & Gleaves, 1993). The 26-item version of the EAT is highly correlated with the original 40-item version ($r=.93$; Garner et al., 1982), which has been shown to assess both cognitive and behavioral factors related to eating disorders (Garner & Garfinkel, 1979). The screening questionnaire also included an item asking if the participant was willing to be contacted for a more in-depth assessment study of "eating attitudes and behaviors in college women."

Surveys were mailed to 2044 women; 264 women returned the survey yielding a response rate of 13.0%. Of the 264 women who returned the survey, 91% (241) agreed to be contacted for participation in this study. One hundred and seventeen women were successfully re-contacted and agreed to participate. As this study's aims were to assess the relationship between eating-related pathology and general psychopathology and quality of life, maximum variability in eating pathology was sought. Therefore, scores from the EAT-26 were used to ensure participation of women across the full range of eating pathology from asymptomatic to subthreshold

eating disordered by first recruiting women with extreme scores on the EAT-26.

However, by the termination of recruitment, women from the entire spectrum of EAT-26 scores were included. The mean EAT-26 score of participants was 14.78 ($SD=14.75$). T-tests revealed that the EAT-26 scores of the 117 women who participated did not differ from those who returned the survey but did not participate [$t(262)=1.63, p=.10$].

Because the study was designed to assess relationships between eating-related pathology and general psychopathology and quality of life in a nonclinical sample, 11 women were excluded due to a current or lifetime eating disorder diagnosis as assessed by the Structured Clinical Interview for Axis I, DSM-IV Diagnoses—Non-Patient Edition (SCID-I/NP; First, Spitzer, Gibbon & Williams, 1995), yielding a total of 106 participants. With the exception of BED, women meeting criteria for Eating Disorder Not Otherwise Specified (EDNOS) were not excluded. Of the 11 excluded participants, three (2.6%) met past criteria for AN, four (3.4%) met past criteria for BN, two (1.7%) met current criteria for BN, and two (1.7%) met current criteria for BED. The women who were excluded were given referrals for treatment.

Participants

Eligible participants were 106 first-year, female college students at a large, public university. Their mean age was 19.0 ($SD=0.46$). The majority of participants self-identified as Caucasian (86%) with 6% identifying as Asian American, 2% African American, 2% Latina, and 4% self-identifying as mixed race/other.

Procedure The model of depression and anxiety presented by Clark and Watson (1991)

Upon presentation to the laboratory, participants were asked to give written informed consent. Those women who agreed to participate in the study were asked to complete a two-hour assessment consisting of a structured interview that assessed disordered eating attitudes and behaviors, and several self-report measures. They were paid \$20 for their participation. Interviews were conducted by female graduate students extensively trained on the assessments (see Instruments).

Instruments

Demographic Information. Age and race/ethnicity information was gathered by the interviewers.

Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report questionnaire designed to measure depressive symptoms and attitudes. It has high internal consistency, test-retest reliability, and construct validity (Beck et al., 1996). Cronbach coefficient alpha in this sample was 0.91.

Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988). The BAI is a 21-item self-report questionnaire designed to measure anxiety symptoms. It was developed to discriminate anxiety from depression. The BAI has been shown to have high internal consistency, test-retest reliability, and good concurrent and discriminant validity (Beck et al., 1988). In this sample, Cronbach coefficient alpha was 0.84.

Mood and Anxiety Symptom Questionnaire (MASQ-Short Version; Watson & Clark, 1991). The MASQ is a 60-item self-report questionnaire developed to assess

the tripartite model of depression and anxiety proposed by Clark and Watson (1991). It includes subscales designed to assess general distress, specific anxiety, and specific depression. The MASQ has been shown to have excellent convergent and discriminant validity in that it measures the constructs of anxiety and depression with minimal overlap (Ruth & Mehtrota, 2001). Cronbach coefficient alpha in this sample was 0.94.

State-Trait Anxiety Inventory—Trait Version (STAI-T; Spielberger, 1983).

The STAI-T is a 20-item self-report measure designed to assess general anxiety. It has been shown to have adequate internal consistency, test-retest reliability, and concurrent validity (Spielberger, 1988). It is a widely used measure of anxiety but it has not been shown to discriminate anxiety from depression (Ruth & Mehtrota, 2001). Cronbach coefficient alpha in this sample was 0.87.

Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969). The SADS is a 28-item self-report scale designed to assess two aspects of social-evaluative anxiety, distress in social situations and avoidance of social situations. The scale has been shown to have excellent test-retest reliability (García-López, Olivares, Hidalgo, Beidel, & Turner, 2001), good convergent and discriminant validity (Montgomery & Haemmerlie, 1982; Watson & Friend, 1969), and its construct validity has been demonstrated (Patterson & Strauss, 1972). For this sample, Cronbach coefficient alpha was 0.87.

Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969). The FNE is a 30-item self-report scale designed to assess fear of negative evaluations from others, including apprehension about the evaluations of others, distress over negative evaluations, avoidance of evaluative situations, and expectations that others will evaluate oneself negatively. It has excellent test-retest reliability (García-López et al., 2001), good internal consistency (Segal & Figley, 1985) and convergent and discriminant validity (Watson & Friend, 1969). Cronbach coefficient alpha in this sample was 0.95.

Alcohol Use Disorders Identification Test (AUDIT; Babor, de la Fuente, Saunders, & Grant, 1992). The AUDIT is a 10-item self-report questionnaire designed to assess hazardous or harmful alcohol consumption. It includes items assessing amount and frequency of alcohol use, alcohol dependence, and problems caused by alcohol. It has been normed for use with college populations (Fleming, Barry, & MacDonald, 1991), and has been shown to have high internal consistency, test-retest reliability, and excellent concurrent validity (for a review see Allen, Reinert, & Volk, 2001). For this sample, Cronbach coefficient alpha was 0.81.

Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989). The RAPI is a 23-item self-report designed to assess adolescent problem drinking. It was developed to assess the negative consequences associated with drinking in adolescence as opposed to gathering information on drinking patterns. It has good internal consistency and convergent validity (White & Labouvie, 1989). Cronbach coefficient alpha for this sample was 0.93.

Drug Use and Smoking Scale (DUS). Drug use was assessed using a self-report questionnaire that asked about the frequency of participant's use of marijuana, amphetamine ("crystal meth"), cocaine, and MDMA ("ecstasy"; 3, 4-Methylenedioxymethamphetamine). Participants responded on a 5-point Likert scale from "never" to "everyday." This measure has been used to assess drug use in college students (Hutchinson, McGeary, Smolen, Bryan, & Swift, 2002). Cronbach coefficient alpha for the three items was 0.57.

Smoking Scale (SMOKE). Smoking was assessed using a single item that assessed the frequency of smoking on a 7-point Likert scale ranging from "I'm a non-smoker" to "I smoke everyday." This item has been used to assess smoking in college students in previous research (e.g., Hutchinson et al., 2002).

Interpersonal Competence Questionnaire (ICQ); Buhrmester, Furman, Wittenberg, & Reis, 1988). The ICQ is a 40-item self-report questionnaire designed to assess interpersonal competence in friendships and romantic relationships in college students. It is comprised of five dimensions: initiating relationships, self-disclosure, assertion, emotional support of others, and conflict management. The scale has been shown to have high internal consistency and test-retest reliability, as well as concurrent and discriminant validity (Buhrmester et al., 1988). Cronbach coefficient alpha was 0.91 in this sample.

Satisfaction With Life Scale (SWLS); Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is a scale designed to measure global life satisfaction. It has been shown to have high internal consistency and high temporal reliability (Diener et al.,

1985). It has been extensively used with college students and has been shown to have good convergent validity in that it is highly correlated with both peer and clinician ratings (Pavot, Diener, Colvin, & Sandvik, 1991). In this sample, Cronbach coefficient alpha was 0.85.

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965). This 10-item scale measures global self-esteem and feelings of self-worth. The RSE has excellent internal consistency and test-retest reliability, and its construct validity has been well-documented (for a review see Byrne, 1996). In addition, its construct validity as a measure of self-esteem in disordered eating populations has been established (Griffiths et al., 1999). Cronbach coefficient alpha was 0.89 in this sample.

Stress of Freshman Year Scale (SFYQ; Niemeier & Craighead, 2001). This 7-item self-report scale was developed for this study in order to assess the subjective experience of stress during the first year of college. Participants answered questions regarding their perceived level of stress in general, in academic experiences, and in various interpersonal relationships. Participants answered on a 7-point Likert scale from "not at all stressful" to "extremely stressful." Cronbach coefficient alpha was 0.69 in this sample.

Eating Disorder Examination (EDE; Fairburn & Cooper, 1993). The EDE is a semistructured clinical interview designed to assess disordered eating attitudes and behaviors; it is considered the gold standard in the assessment of eating disorders. For this study, the portions of the interview assessing the behavioral components of eating disorders were used, including the dietary restraint subscale (EDE-R), the items

assessing the frequency of binge eating episodes (subjective and objective) in the past three months, and the items assessing the frequency of compensatory behaviors (purging, laxatives, diuretics, and excessive exercise) in the past three months. The EDE has well-established reliability and validity (Fairburn & Cooper, 1993; Wilson & Smith, 1989), and the importance of the use of interviews to assess disordered eating behaviors has been well-documented (Black & Wilson, 1996; Fairburn & Beglin, 1994; Luce & Crowther, 1999). In this sample, the coefficient alpha was 0.82 for the EDE-R subscale.

Eating Disorder Examination—Questionnaire (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q is a 40-item self-report version of the EDE. The three subscales of the EDE-Q that assess attitudes were used for this study: (1) Eating Concerns, (2) Weight Concerns, and (3) Shape Concerns. In addition, two items from the EDE-Q that assess binge eating and feeling out of control while eating were used as continuous measures of binge eating. The EDE-Q correlates highly with the EDE interview (Fairburn & Beglin, 1994), and has been shown to have excellent internal consistency and test-retest reliability (Luce & Crowther, 1999). In this sample, Cronbach coefficient alpha was 0.86 for the Eating Concerns subscale, 0.85 for the Weight Concerns subscale, and 0.90 for the Shape Concerns subscale.

Binge Eating Scale (BES; Gormally, Black, Daston, & Rardin, 1982). The BES is a 16-item self-report questionnaire designed to assess overeating and binge eating. It measures behaviors, feelings, and thoughts associated with binge eating, and

has good internal consistency (Gormally et al., 1982). The EDE provided the number of episodes of binge eating, and the BES was used as a global measure of binge eating behaviors, thoughts, and feelings. Cronbach coefficient alpha in this sample was 0.89.

Three Factor Eating Questionnaire—Restraint Scale (TFEQ-R; Stunkard & Messick, 1985). The TFEQ-R is a 21-item self-report scale assessing dietary restraint that has been shown to have good internal consistency, test-retest reliability, and convergent and divergent validity in several studies (for a review, see Gorman & Allison, 1995). It has also been normed with female college students (Allison, Kalinsky, & Gorman, 1992). Cronbach coefficient alpha in this sample was 0.86.

Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987). The BSQ is a 34-item self-report measure that assesses specific concerns about body shape, particularly the experience of feeling fat. The measure has high internal consistency, test-retest reliability, and concurrent validity with other measures of body satisfaction (Rosen, Jones, Ramirez, & Waxman, 1996). Cronbach coefficient alpha in this sample was 0.97.

Preoccupation with Eating, Weight, and Shape Scale (PEWS; Craighead & Niemeier, 2001). The PEWS is an 8-item self-report modified from the Modified Distressing Thoughts Questionnaire (Clark, Feldman, & Channon, 1989). The PEWS was specifically developed to assess preoccupations with food and eating, and weight and shape. It assesses not only the amount of time spent thinking about food and eating or weight and shape (in percent of day), but also the extent to which the

thoughts cause respondents distress, are difficult to stop, and interfere with concentration. The PEWS has been used with female college students, women with BED, and women with BN, and has been shown to have high internal consistency, concurrent and discriminant validity, and sensitivity to change (Niemeier, Craighead, Pung, & Elder, 2002). In this sample, Cronbach coefficient alpha was 0.92.

Analytic Approach

As the goal of the analysis was to examine the underlying relationships among eating-related pathology and general psychopathology and quality of life, multiple scales assessing each construct were used. As outlined below, a series of factor analyses were performed in order to create composite variables from these scales to be used in the primary analyses. The use of factor analyses allowed for the creation of more precise variables measuring the constructs of interest in this study in that they were created from multiple indicators, thereby enhancing reliability and validity (Kline, 1998).

Preliminary Exploratory Factor Analyses. The factor structure of each of the individual scales was examined using an exploratory principal components factor analysis. Although several of the scales have been factor analyzed in prior studies, the analyses were conducted on this data to ensure that the factor structure was replicated in this sample. As the majority of assessments were designed to measure a single construct of interest, we expected the first component to have a large eigenvalue in most cases. Therefore, if the first unrotated factor had an eigenvalue that was substantially larger than the others (providing support for a one-factor solution), the

first unrotated principal component was used. All items with a loading of greater than 0.50 on the first unrotated factor were retained. If the eigenvalues and their differences supported the presence of more than one factor, principal factors extraction with varimax rotation was performed using the number of factors indicated by the examination of the eigenvalues and their differences from the principal components analysis. The factor loadings were then examined to determine the nature of each factor. If the factor structure was interpretable, multiple factors were retained. Again, items with a loading of greater than 0.50 were retained on the appropriate factor.

All items retained from each scale were standardized and a factor score (or multiple factor scores where multiple factors were retained) was calculated for each person by taking the mean of the items contributing to that factor.

Secondary Exploratory Factor Analysis. To create the variables to be used in the planned simple and multiple regressions, three second-order factor analyses were performed by entering the factor scores from the scales assessing general psychopathology (AUDIT, BAI, BDI, DUS, FNE, MASQ, RAPI, SADS, SMOKE, and STAI-T), quality of life (ICQ, RSE, SFYQ, SWLS), and eating pathology (BSQ, BES, EDE, EDEQ, PEWS, TFEQ-R) into three separate exploratory principal components factor analysis. The eigenvalues and their differences were examined and principal factors extraction with varimax rotation was performed. Factor scores with a loading of greater than 0.50 were retained.

Composite variables were created by calculating the mean of the factors scores that loaded higher than 0.50 on the factor of interest. These variables were then used as the measures of eating-related pathology, general psychopathology, and quality of life in the planned analyses.

Primary Analyses. To test the first specific aim, a series of simple regressions were performed. Each of the general psychopathology variables and quality of life variables were regressed on each of the eating pathology variables to determine whether each individual domain of eating pathology was related to each area of general psychopathology and quality of life.

To test the second specific aim, a series of multiple regressions were performed. Each of the general psychopathology variables and quality of life variables were regressed on each eating pathology variable and the squared term of the respective eating pathology variable. A significant relationship between the squared term and the dependent variable would indicate the presence of a nonlinear relationship between the eating pathology variable and the dependent variable such that the association between the two depends on the level of the eating pathology variable.

To test the third specific aim, a series of multiple regressions were performed. Each of the general psychopathology variables and quality of life variables were regressed on the entire set of eating pathology variables in order to determine whether each variable was predictive above and beyond the others.

Preliminary Exploratory Factor Analysis

General Psychopathology Variables. The factor structures of the scales assessing general psychopathology (AUDIT, BAI, BDI, DUS, FNE, MASQ, RAPI, SADS, and STAI-T) were examined using separate exploratory principal components factor analyses for each measure. As anticipated, an examination of the factor structure of each scale revealed that six of the scales (AUDIT, BAI, BDI, DUS, FNE, and RAPI) had large first eigenvalues providing support for one-factor solutions. For each of these scales, the first unrotated factor was retained and items with a factor loading of greater than 0.50 were standardized and the mean was calculated to create a factor score from each scale. For the remaining scales (the MASQ, SADS, and STAI-T) principal factors extraction with varimax rotation was used. The multiple factors extracted are described below.

For the MASQ, two- and three-factor solutions were extracted and the two-factor solution was selected because the item factor loadings maximized the distinction between anxiety and depression according to the scales proposed by Watson and Clark (1991). An examination of the item loadings revealed that the first factor included 11 items that Watson and Clark labeled as general distress-depressed symptoms and 15 items they labeled as anhedonic depression symptoms. The second factor included eight items labeled by Watson and Clark as anxious arousal symptoms, and four items labeled as general distress-anxious symptoms. Two factor scores labeled as depression (MASQ-DEP) and anxiety (MASQ-ANX) were created

by taking the mean of all items with a loading of greater than 0.50 on the respective factor.

The principal components factor analysis for the SADS suggested a two-factor solution. An examination of the item loadings revealed that the first factor included items relating to social anxiety experienced in the presence of strangers, whereas the second factor included items relating to avoidance of social situations. Two factor scores labeled as anxiety with strangers (SADS-STR) and avoidance of social situations (SADS-AVD) were created by taking the mean of all of the items with a loading of greater than 0.50 on the respective factor.

For the STAI-T, the principal components factor analysis suggested a two-factor solution. The item loadings revealed that the first factor included items relating to mood states (i.e., "I feel pleasant," "I am calm, cool, and collected"), and the second factor included items relating to ruminative anxious cognitions (i.e., "Some unimportant thought runs through my mind and bothers me," "I have disturbing thoughts"). Two factor scores labeled as mood states (STAI-MOOD) and anxious cognitions (STAI-COG) were created by taking the mean of all of the items with a loading of greater than 0.50 on the respective factor.

Quality of Life Variables. The factor structures of the scales assessing quality of life (JCQ, RSE, SFYQ, SWLS) were examined using separate exploratory principal components factor analyses for each scale. An examination of the factor structure of each scale revealed that three of the scales (RSE, SFYQ, and SWLS) had large first eigenvalues providing support for one-factor solutions. For each of these measures,

the first unrotated factor was retained and items with a factor loading of greater than 0.50 were standardized and the mean was calculated to create a factor score from each scale.

The principal components factor analysis for the ICQ suggested a four-, five-, or six-factor solution. Because the ICQ was developed as a measure of five domains of interpersonal competence, five factors were extracted using principal factors extraction with varimax rotation. The item loadings on the five factors were consistent with the five domains proposed by Bahemster et al. (1988), therefore the five-factor solution was retained. Factor scores were created on each domain by calculating the mean of all items with a factor loading of greater than 0.50 in the respective factor. The five scale scores created were initiating relationships (ICQ-INT), self-disclosure (ICQ-DIS), asserting displeasure with others' actions (ICQ-NEG), providing emotional support (ICQ-EMOT), and managing interpersonal conflicts (ICQ-CON).

Eating Pathology Variables. The factor structures of the scales assessing eating pathology (BSQ, EDE-R, EDE-Q, PEWS, TFEQ-R) were examined using separate exploratory principal components factor analyses for each scale. An examination of the factor structure of each scale revealed that four of the scales (BSQ, EDE-R, PEWS, and TFEQ-R) had large first eigenvalues providing support for one-factor solutions. For each of these scales, the first unrotated factor was retained and items with a factor loading of greater than 0.50 were standardized and the mean was calculated to create factor scores from each measure.

The principal components factor analysis for the EDE-Q suggested a two-factor solution, therefore two factors were extracted using principal components extraction with varimax rotation. An examination of the item loadings revealed that the first factor included four of the five items from the weight concerns subscale and seven of the eight items from the shape concerns subscale suggested by Fairburn and Beglin (1994); the second factor included all five items from the eating concerns subscale. Two factor scores labeled as weight and shape concerns (EDEQ-WS) and eating concerns (EDEQ-EC) were created by taking the mean of all items with a loading of greater than 0.50 on the respective factor.

To create a variable assessing binge eating, first, four items from the BES were chosen after doing an exploratory principal components factor analysis on that scale. A three-factor structure was extracted by principal factors extraction with varimax rotation. The factor structure was examined and the factor on which the behavioral items loaded was identified. The four items loading on the binge eating behavioral factor from the BES were chosen for inclusion in order to create a variable assessing the behavioral component of binge eating as opposed to thoughts or feelings associated with binge eating, which are also assessed by the BES. Then, the binge eating episode items from the EDE (six items assessing frequency of objective and subjective binge episodes in the past three months), two binge eating-related items from the EDE-Q, and the four behavioral items from the BES were entered into an exploratory principal components factor analysis. An examination of the eigenvalues and their differences from the principal components factor analysis of the binge-

related items from these three scales suggested a one-factor solution. Therefore, the first unrotated factor was retained and mean scores were calculated from the items loading greater than 0.50 on the first factor. This factor score was labeled

BINGEING.

An examination of the descriptive statistics and distributions of the compensatory behavior episode items from the EDE revealed highly skewed distributions, with the majority of participants scoring zero on many of the items. Because there were no continuous measures of compensatory behaviors available, and the distribution of scores on the interview items were not appropriate for inclusion in the planned analyses, these variables were not retained for further analyses.

The alpha coefficient for each factor was calculated using only the items retained after the preliminary exploratory factor analyses and are reported for each factor in Table 1.

Measure	Alpha	Measure	Alpha
AUDIT	0.86	EDE-NEG	0.87
BAJ	0.83	MARG-ANS	0.87
BDI	0.92	MARG-DIS	0.88
BINGEING	0.87	FEARS	0.88
BSQ	0.87	EAT-26	0.88
DUS	0.87	BSQ	0.88
EDEQ-IC	0.88	CAGE-15	0.88
EDEQ-NS	0.84	ICQ-INT	0.88
EDE-R	0.82	SPSQ	0.87
FNE	0.93	STAI-CO	0.83
ICQ-CO	0.80	STAI-MOOD	0.82
ICQ-DIS	0.79	TRIS	0.82
ICQ-EMOT	0.71	TSPQ-R	0.82
ICQ-INT	0.80		

Table 1. Cronbach Coefficient Alpha for Factor Scores Created from Preliminary Exploratory Factor Analyses

Measure	Alpha	Measure	Alpha
AUDIT	0.86	ICQ-NEG	0.87
BAI	0.83	MASQ-ANX	0.95
BDI	0.92	MASQ-DEP	0.86
BINGEING	0.87	PEWS	0.95
BSQ	0.97	RAPI	0.94
DUS	0.57	RSE	0.90
EDEQ-EC	0.90	SADS-AVD	0.84
EDEQ-WS	0.94	SADS-STR	0.83
EDE-R	0.82	SFYQ	0.71
FNE	0.95	STAI-COG	0.83
ICQ-CON	0.90	STAI-MOOD	0.92
ICQ-DIS	0.79	SWLS	0.86
ICQ-EMOT	0.71	TFEQ-R	0.92
ICQ-INIT	0.90		

Secondary Exploratory Factor Analyses

General Psychopathology Variables. Next, a second-order factor analysis was conducted by entering the principal factors from each psychopathology scale (AUDIT, BAI, BDI, DUS, FNE, MASQ-ANX, MASQ-DEP, RAPI, SADS-AVD, SADS-STR, SMOKE, STAI-MOOD, and STAI-COG) into an exploratory principal components factor analysis. An examination of the eigenvalues and their differences suggested a three- or four-factor solution. Three- and four-factor solutions were extracted using principal factors extraction with varimax rotation. The three-factor solution was selected because the factor loadings were consistent with three major areas of psychopathology of interest in this study, depression, anxiety, and substance abuse. An examination of the loadings revealed that the first factor included factor scores created from both assessments designed to measure depression and assessments designed to measure anxiety (BDI, FNE, MASQ-DEP, SADS-STR, SADS-AVD, STAI-MOOD, and STAI-COG). This variable is described as negative affect. The second factor included factor scores created from assessments of substance abuse including alcohol use, drug use, and smoking (AUDIT, DUS, RAPI, SMOKE), and was labeled substance use. The third factor included factor scores created from assessments specifically developed to differentiate anxiety from depression (BAI, MASQ-ANX), and was therefore labeled anxiety. Therefore, three composite variables were created: negative affect, anxiety, and substance use.

Quality of Life. A second-order factor analysis was conducted by entering the principal factors from each quality of life scale (ICQ-CON, ICQ-DIS, ICQ-EMOT,

ICQ-INIT, ICQ-NEG, RSE, SWLS, and SFYQ) into an exploratory principal components factor analysis. An examination of the eigenvalues and their differences suggested a two-factor solution. The two-factor solution was extracted using principal factors extraction with varimax rotation. The first factor included the factor scores created from the ICQ, including ICQ-INIT, ICQ-NEG, ICQ-DIS, and ICQ-CON, and was labeled interpersonal competence. The second factor included the factor scores from the RSE, SWLS, and the SFYQ, and was termed general satisfaction. Therefore, two composite variables were created: interpersonal competence and general satisfaction.

Eating Pathology Variables. Next, the principal factors from the scales assessing eating pathology (BINGE, BSQ, EDEQ-EC, EDEQ-SW, EDE-R, PEWS, and TFEQ-R) were entered into an exploratory principal components factor analysis. Although an examination of the eigenvalues and their differences suggested a two-factor solution, both the two- and three-factor solutions were extracted using principal components extraction with varimax rotation because of the importance of the theoretical existence of three factors associated with eating disorders including attitudes, dietary restraint, and binge eating. An examination of the two-factor structure revealed that one factor included factor scores from the attitudinal scales, and the other included all of the behavioral factor scores. Factor score loadings on the three-factor solution were consistent with the planned analyses in that the first factor consisted of factor scores created from assessments of eating attitudes (i.e., BSQ, EDEQ-SW, EDEQ-EC, and PEWS), the second factor consisted of factor scores

created from assessments of dietary restriction (i.e., EDE-R, TFEQ-R), and the third factor included only the binge eating score (BINGEING). Because of our interest in examining the differential impact of specific domains of disordered eating, the three-factor solution was chosen yielding three composite variables: disordered eating attitudes, dietary restriction, and bingeing.

Each of the composite variables created for the primary analyses are listed in Table 2 with the factor scores that were included in their calculation.

Table 2. Factor Scores Included in the Calculation of Each of the Composite Variables Used in Primary Analyses

Composite Variables	Factor Scores Included in Calculation
Negative Affect	BDI, FNE, MASQ-DEP, SADS-AVD, SADS-STR, STAI-COG, STAI-MOOD
Anxiety	BAI, MASQ-ANX
Substance Use	AUDIT, DUS, RAPI, SMOKE
Interpersonal Competence	ICQ-CON, ICQ-DIS, ICQ-INIT, ICQ-NEG
General Satisfaction	RSE, SFYQ, SWLS
Disordered Eating Attitudes	BSQ, EDEQ-SW, EDEQ-EC, PEWS
Dietary Restriction	EDE-R, TFEQ-R
Bingeing	BINGEING (includes items from BES, EDE, and EDE-Q)

Data Screening

Descriptive statistics for each of the composite variables (i.e., NEGATIVE AFFECT, ANXIETY, SUBSTANCE USE, INTERPERSONAL COMPETENCE, GENERAL SATISFACTION, DISORDERED EATING ATTITUDES, DIETARY RESTRICTION, AND BINGEING) created were generated, and all variables were assessed for normal distribution. The variable BINGEING was positively skewed, so a log transformation was performed. All analyses involving bingeing were conducted with the transformed variable. Table 3 displays the correlations amongst the composite variables.

Table 3. Correlations amongst the Composite Variables

Variable	1	2	3	4	5	6	7	8
1. Disordered Eating Attitudes	-							
2. Dietary Restraint	0.70**	-						
3. Bingeing	0.70**	0.55**	-					
4. Negative Affect	0.54**	0.31*	0.36*	-				
5. Anxiety		0.40**	0.28*	0.34*	0.38**	-		
6. Substance Use	0.13	-0.00	0.21*	0.09	0.22*	-		
7. Interpersonal Competence	-0.20*	-0.11	-0.23*	-0.53**	-0.10	0.02	-	
8. General Satisfaction	-0.39**	-0.24*	-0.32*	-0.73**	-0.34*	-0.26*	0.35*	-

* $p < 0.05$, ** $p < 0.0001$

Primary Analyses

For the first specific aim, a series of simple regressions were performed in which the general psychopathology variables (negative affect, anxiety, and substance use) and the quality of life variables (interpersonal competence and general satisfaction) served as dependent variables and were regressed on each of the eating pathology variables (disordered eating attitudes, dietary restraint, and bingeing).

As predicted, higher levels of disordered eating attitudes were associated with higher negative affect [$F(1, 104)=43.26, p<0.0001$], higher anxiety [$F(1, 104)=20.08, p<0.0001$], lower interpersonal competence [$F(1, 104)=4.14, p=0.04$], and lower general satisfaction [$F(1, 104)=18.20, p<0.0001$]. As predicted, eating attitudes did not predict substance use [$F(1, 104)=1.87, n.s.$].

As predicted, higher levels of dietary restriction were associated with higher negative affect [$F(1, 104)=10.90, p=0.0013$], higher anxiety [$F(1, 104)=8.88, p=0.0036$], and lower general satisfaction [$F(1, 104)=6.41, p=0.01$]. As predicted, dietary restriction was not associated with substance use [$F(1, 104)=0.00, n.s.$]. Contrary to predictions, dietary restriction was not associated with interpersonal competence [$F(1, 104)=1.38, n.s.$].

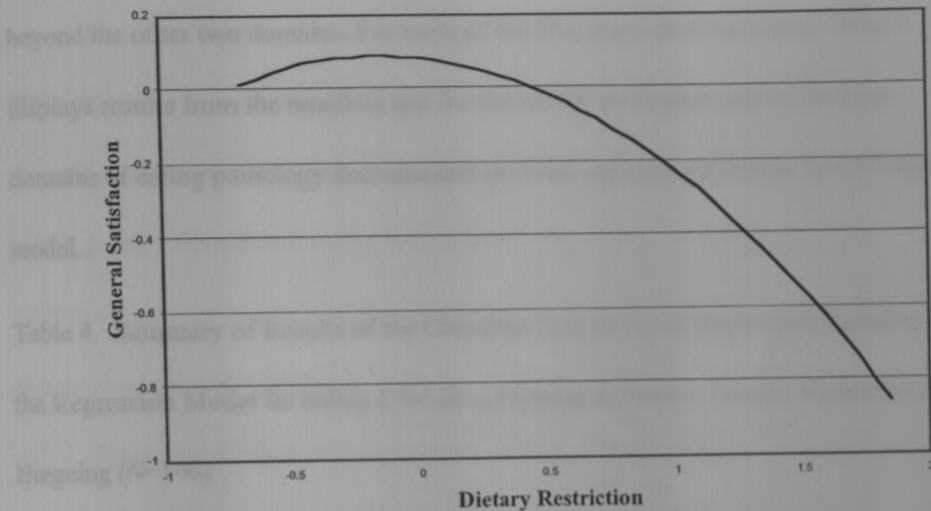
As predicted, higher levels of bingeing were associated with higher negative affect [$F(1, 104)=15.39, p=0.0002$], higher anxiety [$F(1, 104)=13.99, p=0.0003$], higher substance use [$F(1, 104)=4.73, p=0.03$], lower interpersonal competence [$F(1, 104)=5.80, p=0.02$], and lower general satisfaction [$F(1, 104)=11.97, p=0.0008$].

For the second specific aim, a series of multiple regressions were performed. Each of the general psychopathology variables (negative affect, anxiety, and substance use) and each of the quality of life variables (interpersonal competence and general satisfaction) were regressed on each of the eating pathology variables (eating attitudes, dietary restriction, and bingeing) and a squared term of each eating pathology variable.

As predicted, there was no evidence for a nonlinear relationship between eating attitudes and negative affect [$F(1, 103)=0.32, n.s.$], anxiety [$F(1, 103)=0.01, n.s.$], substance use [$F(1, 103)=0.13, n.s.$], interpersonal competence [$F(1, 103)=0.30, n.s.$], or general satisfaction [$F(1, 103)=0.82, n.s.$].

As predicted, there was no evidence for a nonlinear relationship between dietary restriction and negative affect [$F(1, 103)=0.06, n.s.$], anxiety [$F(1, 103)=1.74, n.s.$], substance use [$F(1, 103)=0.46, n.s.$], or interpersonal competence [$F(1, 103)=0.15, n.s.$]. The nonlinear relationship between dietary restriction and satisfaction with life approached significance [$F(1, 103)=3.31, p=0.07$] such that at average levels of restriction, dietary restriction was not associated with general satisfaction, but at above average levels of restriction, as restriction increased, general satisfaction decreased. This relationship is presented graphically in Figure 1.

Figure 1. The Relationship Between Dietary Restriction and General Satisfaction



Finally, as predicted, there was no evidence for a nonlinear relationship between bingeing and negative affect [$F(1, 103)=0.92, n.s.$], anxiety [$F(1, 103)=1.35, n.s.$], substance use [$F(1, 103)=0.53, n.s.$], interpersonal competence [$F(1, 103)=1.51, n.s.$], or general satisfaction [$F(1, 103)=0.30, n.s.$].

To examine the third specific aim, a series of multiple regressions were performed. Each of the five dependent variables (negative affect, anxiety, substance use, interpersonal competence, and general satisfaction) were regressed on all three of the eating pathology variables (disordered eating attitudes, dietary restriction, and bingeing). In addition, because there was evidence for a nonlinear relationship between dietary restriction and general satisfaction, the squared term of dietary restriction was included in the model predicting this variable. As this specific aim was

exploratory in nature, each domain of eating disordered symptomatology was examined to see whether it would predict the five dependent variables above and beyond the other two domains. For each of the five dependent variables, Table 4 displays results from the omnibus test for the model including each of the three domains of eating pathology domains and the total variance accounted for (R^2) by the model.

Table 4. Summary of Results of the Omnibus Test for Each Dependent Variable for the Regression Model Including Disordered Eating Attitudes, Dietary Restriction, and Bingeing ($N=106$)

	F	R^2
Negative Affect	14.87**	0.30
Anxiety	6.95*	0.17
Substance Use	2.49	0.07
Interpersonal Competence	2.08	0.06
General Satisfaction ^a	6.60**	0.21

^aRegression model included the squared term of dietary restriction.

* $p < 0.001$, ** $p < 0.0001$.

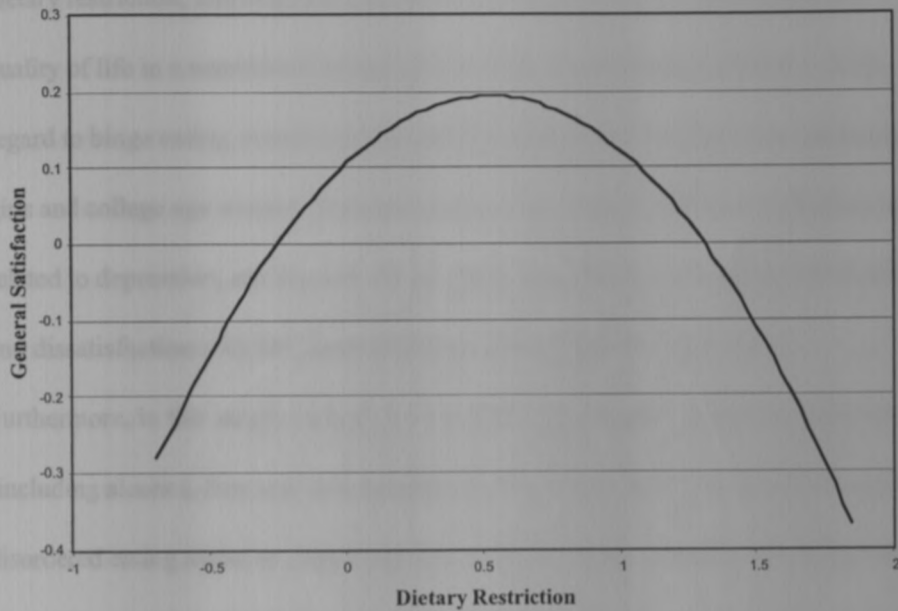
As predicted, higher bingeing marginally significantly predicted higher substance use [$F(1, 102)=3.53, p=0.06$] above and beyond disordered eating attitudes and dietary restriction. Contrary to predictions, bingeing did not predict negative affect [$F(1, 102)=0.04, n.s.$], anxiety [$F(1, 102)=0.98, n.s.$], interpersonal competence

[$F(1, 102)=1.96, n.s.$], or general satisfaction [$F(1, 101)=0.12, n.s.$] over and above disordered eating attitudes and dietary restriction.

However, higher disordered eating attitudes predicted higher negative affect [$F(1, 102)=23.14, p<0.0001$], higher anxiety [$F(1, 102)=4.84, p=0.03$], and lower general satisfaction [$F(1, 101)=9.06, p=0.003$] above and beyond dietary restriction and bingeing. Disordered eating attitudes did not predict substance use [$F(1, 102)=0.49, n.s.$] or interpersonal competence [$F(1, 102)=0.49, n.s.$] above and beyond dietary restriction and bingeing.

Dietary restriction and its squared term were both significant in the prediction of general satisfaction [$F(1,101)=4.33, p=0.04$; $F(1,101)=6.45, p=0.01$, respectively] while controlling for disordered eating attitudes and bingeing. The slope of the relationship between dietary restriction and satisfaction at below average levels of dietary restriction was positive, indicating that at this level, as dietary restraint increases, general satisfaction increases, when controlling for disordered eating attitudes and bingeing. However, at above average levels of dietary restriction, the slope is significantly negative such that as dietary restriction increases, general satisfaction decreases, when controlling for disordered eating attitudes and dietary restriction. This relationship is presented graphically in Figure 2.

Figure 2. The Relationship Between Dietary Restriction and General Satisfaction When Controlling for Disordered Eating Attitudes and Bingeing



Dietary restriction did not predict negative affect [$F(1, 102)=1.44, n.s.$], anxiety [$F(1, 102)=0.02, n.s.$], substance use [$F(1, 102)=2.66, n.s.$], or interpersonal competence [$F(1, 102)=0.25, n.s.$], above and beyond disordered eating attitudes and bingeing.

Discussion

The primary aim of this study was to examine the relationships among three specific domains of eating disordered symptomatology (disordered eating attitudes, dietary restriction, and bingeing) and measures of general psychopathology and quality of life in a nonclinical sample of first-year, female college students. With regard to binge eating, results support and extend previous findings with adolescent girls and college age women. Previous research has found subthreshold bingeing to be related to depression, anxiety, and substance use, as well as interpersonal difficulties and dissatisfaction with life; these findings were replicated in this study.

Furthermore, in this sample, bingeing marginally significantly predicted substance use (including alcohol, drug use, and smoking) above and beyond dietary restriction and disordered eating attitudes, suggesting that of the domains of disordered eating, binge eating is especially associated with the use of substances in college women. This is consistent with previous research that has proposed that the relationship between binge eating and substance use results from an underlying impulsivity dimension common to those who practice both sets of behaviors (Peñas Lledó & Waller, 2001).

Surprisingly, bingeing did not predict negative affect or anxiety above and beyond dietary restriction and disordered eating attitudes. This finding is particularly noteworthy in that the majority of research on the impact of subthreshold disordered eating has focused primarily on this behavior. Although our findings support the association between bingeing and general psychopathology and decreased quality of life when examining simple relationships, the inclusion of disordered eating attitudes

and dietary restriction allowed us to highlight which specific disordered eating symptoms *uniquely* predicted the domains of general psychopathology and quality of life. With the use of this more stringent methodology, our findings suggest that the relative impact of binge eating specifically may not be as pronounced as previous findings indicate. Instead, our findings suggest that disordered eating attitudes may better explain the negative effects observed on distress and quality of life.

Disordered eating attitudes (including body dissatisfaction and preoccupation/overconcern with weight, shape, and eating) were associated with increased negative affect and anxiety and decreased interpersonal competence and general satisfaction. Importantly, disordered eating attitudes *uniquely* predicted negative affect, anxiety, and general satisfaction above and beyond the behavioral domains in our sample. Thus, even when controlling for disordered eating behaviors, disordered attitudes regarding weight, shape, and eating are associated with significant distress. The importance of attitudes is particularly noteworthy given that diagnosable eating disorders are distinguishable from subthreshold disordered eating largely due to the presence of more extreme or frequent behaviors that are associated with negative health consequences (i.e., extreme dietary restriction leading to significant weight loss in AN; compensatory behaviors in BN). Our findings suggest that in a nonclinical sample, attitudes predict associated difficulties over and above behaviors, and further, behaviors do not contribute to associated distress beyond the impact of disordered eating attitudes. This finding is particularly important because of the high prevalence of such attitudes in college women. Indeed, as noted earlier,

88% of college women desire to be thinner despite being normal weight (Raudenbush & Zellner, 1997).

This study also examined the implications of dietary restriction; it was associated with increased negative affect and anxiety and decreased general satisfaction when examining the simple relationships. However, when allowing for a nonlinear relationship between dietary restriction and general satisfaction, the findings suggest that at low levels of restriction, there is no relationship between the two. However, at above average levels, dietary restriction is associated with decreased general satisfaction. When controlling for disordered eating attitudes and bingeing, this relationship became even more pronounced such that for those at below average levels of dietary restriction, restriction was actually associated with *increased* general satisfaction, whereas at above average levels of dietary restriction the relationship remained negative (i.e., the relationship followed an inverted-U shape). These findings regarding dietary restriction are consistent with the clinical observation that dietary restriction is less likely to be associated with distress than other disordered eating behaviors because it is compatible with many women's weight loss goals. This is the case with regard to general satisfaction in our sample, but only when women are at or below average levels of restriction. Thus, in moderation, dietary restriction appears to have beneficial effects on general satisfaction when controlling for disordered eating attitudes and bingeing, and negative effects only emerge at more severe levels.

Our findings support the hypothesis that across the continuum of eating pathology in a nonclinical sample, negative effects increase with the level of pathology. In other words, the impact of such attitudes and behaviors on general psychopathology and quality of life increases linearly as the attitudes and behaviors themselves increase. The exception appears to be dietary restriction, where negative effects on general satisfaction were only found at above average levels of restriction. These results are consistent with the notion that dietary restriction is more ego-syntonic than bingeing or disordered eating attitudes.

Importantly, our findings have implications for eating disorder prevention and early intervention programs on college campuses. Outcome studies of such programs with college students suggest that they have been relatively successful in changing disordered eating attitudes, but less effective in changing disordered eating behaviors (e.g., Franko, 1998). Although this has largely been viewed as an indication of the failure of early intervention programs (Grilo, Devlin, Cachelin, & Yanovski, 1997), our findings would suggest that changing attitudes associated with eating disorders may be more important than previously thought. It may be that changing disordered eating attitudes would be sufficient in terms of decreasing the psychological distress experienced by these young women. This may be adequate because prospective studies suggest that disordered eating behaviors of most young women will not escalate to diagnosable levels (Drewnowski et al., 1994). Thus, reducing the impact of disordered eating attitudes on distress may be a more important goal than preventing escalation to full-syndrome eating disorders. Importantly, interventions specifically

targeting body image disturbances (as opposed to disordered eating behaviors) in normative samples of women have been successful in decreasing disordered eating attitudes, specifically body dissatisfaction and preoccupation with weight and eating (Butters & Cash, 1987; Rosen, Cado, Silberg, Srebnik, & Wendt, 1990). Our findings suggest that efforts to intervene with women displaying subthreshold disordered eating attitudes and behaviors may be able to focus primarily on these attitudes, and still effect clinically significant change. In addition, these programs would best be conceptualized as interventions in their own right rather than as programs primarily geared toward the prevention of eating disorders.

In addition, our finding that attitudes associated with disordered eating contribute uniquely to the experience of negative affect, anxiety, and decreased general satisfaction suggest that targeted early interventions need to include a focus on affective psychopathology. This could be accomplished with the use of short-term cognitive behavioral therapy. Cognitive behavioral therapy is the treatment of choice for affective disorders and its successful application to women with full-syndrome eating disorders suggests that it may also be appropriate for subthreshold level conditions. In addition, our finding regarding the association between bingeing and substance use suggests that interventions for women experiencing this symptom should include assessment of and possible intervention regarding substance use as well.

and educational status. In addition, the prevalence of bingeing was very low (13.0%). Women who binge on food are at risk for eating disorders, especially given that the strong relationship between bingeing and eating disorders is well established.

Limitations

There are a number of limitations to this study that must be considered when interpreting the results. First, the use of cross-sectional data limits the conclusions that can be drawn regarding the nature of relationships amongst the concepts of interest. No causal inferences can be made, and there is no way to investigate the temporal nature of these relationships without longitudinal data. Without such data, we are unable to determine whether disordered eating leads to increased psychological symptoms and decreased satisfaction, or whether women who are already experiencing distress are more likely to then develop disordered eating attitudes and behaviors.

In addition, although the use of both self-report and interview measures of disordered eating behaviors was a strength of the study from an assessment standpoint, it is important to point out that disordered eating attitudes was the only eating disorder symptomatology composite variable comprised solely of self-reports. Therefore, it could be that the strong association between disordered eating attitudes and the general psychopathology and quality of life variables was partially due to the common method of assessment.

Furthermore, several factors may limit the generalizability of the results to different populations. First, the sample was homogenous with regard to ethnicity, age, and educational status. In addition, the response rate to the screening survey was very low (13.0%). Women who chose to return the survey may be a biased sample, especially given that the survey was clearly labeled as investigating eating attitudes

and behaviors and the EAT-26 is a measure with high face validity. However, the mean EAT-26 score was similar to that reported by other investigators for female college samples (e.g., Nelson, Hughes, Katz, & Searight, 1999), suggesting that this sample was similar to samples in past studies with this population.

Lastly, the low occurrence of compensatory behaviors in our sample prevented us from evaluating the effect of this important domain of disordered eating. It is likely that compensatory behaviors would also have been a significant predictor of general psychopathology/quality of life. However, because the frequency is low in a subthreshold sample, it seems more important to target disordered eating attitudes, dietary restriction, and bingeing when intervening with this group.

Future Directions

These findings suggest several directions for future research. First, the results should be replicated and extended in a longitudinal design. As noted above, a longitudinal design would allow for an examination of the temporal relationships between disordered eating symptomatology and general psychopathology/quality of life. It may be that findings regarding the association between these areas of psychopathology reflect an underlying vulnerability to psychopathology in general as opposed to reflecting the specific impact of disordered eating symptoms on other areas of life. However, treatment outcome studies generally indicate that depression and general distress decrease with successful treatment of eating disorder symptoms, suggesting that the distress was generated by the eating disorder symptoms specifically (e.g., Wilfley et al., 2002). A large-scale longitudinal study beginning at a

younger age (e.g., early-adolescence) would allow for the assessment of increases in general psychopathology and decreased quality of life after the onset of disordered eating. In addition, in a larger sample, the prevalence of compensatory behaviors would likely be higher, allowing this domain of disordered eating to be investigated. In addition, this study's findings stress the importance of including disordered eating attitudes in future research on the impact of subthreshold disordered eating. To date, research in this area has focused almost exclusively on behaviors, even though attitudinal/cognitive criteria are components of each of the DSM-IV-TR eating disorder diagnoses (APA, 2000).

Summary

In sum, results of this study supported the hypothesis that, in a nonclinical sample of first-year, female college students, disordered eating attitudes and behaviors are associated with increased general psychopathology and decreased quality of life. Specifically, bingeing predicted substance use over and above disordered eating attitudes and behaviors, and disordered eating attitudes predicted negative affect, anxiety, and decreased general satisfaction over and above bingeing and dietary restraint. The effect of dietary restriction on general satisfaction depended on the level of restraint indicating that for this symptom specifically, the effect on satisfaction is qualitatively different depending on its level. However, overall results suggest that the relationships between disordered eating symptoms and general psychopathology/quality of life are linear in nature, and do not depend on the level of the disordered eating symptom. These findings highlight the significant negative

impact of disordered eating attitudes in college women and support the need for interventions designed to address the cognitive aspects of eating disorder pathology (i.e., body dissatisfaction, overconcern with eating, weight, and shape, and preoccupation with eating, weight, and shape) at subthreshold levels.

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