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Women and Addictions: The Role of Personality in Binge Eating Disorder and Alcohol

Dependence

by

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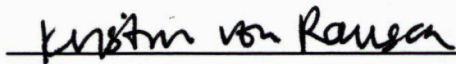
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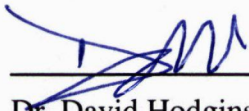
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FACULTY OF GRADUATE STUDIES

The undersigned agree that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Women and Addictions: The Role of Personality in Binge Eating Disorder and Alcohol Dependence" submitted by Erin L. Moss in partial fulfillment of the requirements for the degree of Master of Science.



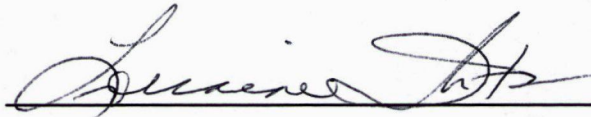
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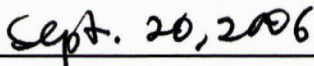
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ABSTRACT

Objective: To evaluate the validity of conceptualizing binge eating as an addiction, the present study examined whether women with binge eating disorder (BED) evidenced addiction-related personality characteristics. **Method:** The sample was composed of an alcohol dependence (AD) group, a BED group, a comorbid group, and a control group. All participants completed a structured diagnostic interview and questionnaires assessing impulsivity, negative emotionality and stress reaction. **Results:** The three diagnostic groups had higher levels of impulsivity than the control group on two measures of impulsivity. The BED group was comparable to the AD group on one measure of general impulsivity. Negative emotionality did not differ between groups. However, the BED and comorbid groups had higher levels of stress reaction than the AD and control groups. **Discussion:** Results suggest that women with BED share similar personality dimensions, particularly impulsivity, with women with substance use disorders.

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Dedication

This thesis is dedicated to my late grandparents, Bill and Doris Hancock. Their love, dedication to family, and emphasis on education continues to be a source of inspiration to me.

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Women and Addictions: The Role of Personality in Binge Eating Disorder and Alcohol Dependence

Addiction is a term that has oft eluded an exact definition. The traditional conceptualization of the construct emphasized physical dependence, with evidence of physiological tolerance and withdrawal. However, newer concepts of addiction have focused on psychological dependence, wherein the emphasis is on compulsive use, loss of control, taking more of a substance than intended, compromised social or occupational functioning, and continued use despite adverse consequences (Akers, 1991). Due to this broadened definition of addiction, some researchers have suggested that there may be commonalities between substance addictions and certain behavioral compulsions (Holden, 2001). This line of thinking has resulted in the introduction of the controversial concept of behavioral addictions, which includes behaviors such as gambling, eating, sex and exercise.

In particular, the notion of eating as an addiction has received widespread acceptance amongst eating disorders clients and clinicians. In support of this view, some researchers have noted behavioral commonalities between eating disorders, especially bulimia nervosa (BN), and alcoholism in terms of progression of the addictive behavior, loss of control over the behavior, preoccupation with the addictive substance, negative health and family consequences, and use of the substance to escape from negative emotional states (Wolfe & Maisto, 2000). Moreover, there also appear to be high rates of comorbidity between traditional substance use disorders and eating disorders. Past research has found that between 3% to 49% of bulimic women report current or past history of alcohol abuse or dependence, while 8% to 40% of alcohol-misusing women

report a current or past history of bulimia nervosa (Holderness, Brooks Gunn, & Warren, 1994). Addiction has thus been proposed as a potential pathway in the development of eating disorders (Gold, Frost-Pineda, & Jacobs, 2003), and many clinicians and treatment settings are adopting an addiction-based framework. In fact, a recent survey suggests that approximately 29% of eating disorder treatment programs and clinicians use addictions-based approaches (von Ranson & Robinson, 2006). Addictions-based self-help treatments for eating disorders, such as Overeaters Anonymous (OA), are also gaining popularity (Stein, O'Byrne, Suminski, & Haddock, 2000).

However, despite the fact that many clinicians have embraced this approach, the validity of the addiction model of eating disorders has received little empirical study. The substantial gap between research and clinical practice suggests a need to carefully investigate the notion of eating as an addiction, particularly given: (1) the large number of individuals attending addiction-based treatment programs (Stein et al., 2000) and (2) the varying treatment aims of different conceptual models of eating disorders (von Ranson & Cassin, in press). In terms of treatment, cognitive behavioral therapy (CBT), regarded as the gold standard for treating BN, attempts to minimize dietary restraint and maladaptive attitudes and behaviors towards food, weight, and body shape (Fairburn, 2002). On the other hand, one well-known addiction treatment approach, proposed by Sheppard (1993), posits that individuals can be addicted to certain foods, such as refined carbohydrates, and calls for elimination of white flour and sugar. This form of treatment is at odds with CBT, which holds that abstinence from certain types of food enhances the focus on dietary restraint.

Presently, there is a paucity of research investigating aspects of the validity of eating disorders as addictions. While many clinicians feel that conceiving eating disorder symptoms as addictive behavior is helpful therapeutically, whether true similarities exist between eating disorders and traditional addictions, such as alcoholism, remains unknown. However, if eating disorders are to be conceptualized and treated as addictions, it is important to step back and examine whether the perceived similarities between the disorders are accurate. If eating disorders and substance use disorders do have common correlates, this would be consistent with the notion of eating as an addiction. As evidenced by the different treatment approaches, the necessity of examining eating disorders as addictions is crucial to inform and develop efficacious treatment efforts.

Personality and Addiction

It has been proposed that the association between eating disorders and substance use disorders is due to shared personality features that predispose individuals to engage in dysfunctional behavior (Kane, Loxton, Staiger, & Dawe, 2004). According to this view, eating disorders and substance use disorders represent different manifestations of an underlying predisposition to addictive behavior resulting from an addictive personality style (Holderness et al., 1994). Personality factors have long been suspected to be influential components in the development of addictive disorders. This assumption has generated a search for a common pattern of personality traits in all addicts (Ball, 2005). While empirical research suggests that there is not a unified theory or specific evidence for an addictive personality that is present in all individuals with substance addictions, certain combinations of personality factors may contribute to risk for addictive behaviors (Butcher, 1988).

Personality, Eating Disorders, and Substance Use Disorders

Studies examining the link among eating disorders, personality and addiction, have found that women with bulimia scored higher than normal female controls and almost as high as both male and female drug addicts on the Addiction scale of the Eysenck Personality Questionnaire (de Silva & Eysenck, 1987; Feldman & Eysenck, 1986). Moreover, female bulimics and female substance abusers have both been characterized by elevations on the Minnesota Multiphasic Personality Inventory depression, anxiety, social withdrawal, anger, and impulsivity scales (Hatsukami, Owen, Pyle, & Mitchell, 1982). The investigators concluded that individuals with BN exhibited personality characteristics related to addiction-proneness.

However, there has been limited research into whether individuals with binge eating disorder (BED) exhibit personality characteristics related to addiction-proneness, despite the fact that BED and BN share certain characteristic features. Binge eating disorder is a form of eating pathology that falls under the category of Eating Disorder Not Otherwise Specified in the current edition of the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition-Text Revision (DSM-IV-TR) (American Psychiatric Association (APA), 2000). BED is characterized by recurrent episodes of binge eating, impaired control over eating and significant distress about eating behaviors; however, individuals with BED do not engage in regular compensatory behavior following a binge episode (APA, 2000). BED is becoming a serious problem in Western society, as evidenced by lifetime prevalence rates of 0.7% - 4% of the population. In comparison, the lifetime prevalence of anorexia is 0.5%, while the lifetime prevalence of BN is 1% - 3% (APA, 2000). BED is also linked with increased risk of obesity, which is of particular

concern given obesity's association with numerous medical conditions including hypertension, stroke, diabetes, and coronary heart diseases (Pi-Sunyer, 1998). Amongst obese individuals in the community, approximately 4.4% meet criteria for BED, whereas up to 30% of individuals in weight control programs have BED (Spitzer et al., 1992). In particular, OA has a surprisingly high frequency of attendees with BED, with estimates around 71% (Spitzer et al., 1992). Studies of obese individuals from the community have also shown that those with BED evidence significantly higher rates of substance use disorders compared to obese individuals without BED (Yanovski et al., 1993).

Thus, BED merits increased research attention, specifically with respect to whether individuals with BED evidence heightened levels of addiction-related personality characteristics. In particular, it is important to examine if individuals with BED share similar personality dimensions with individuals who have other addictions, such as substance use disorders, in order to evaluate the validity of conceptualizing BED as an addiction. Two personality traits that show promise in illuminating a potential association between BED and substance dependence are *negative emotionality* and *impulsivity* (Fischer, Anderson, & Smith, 2004).

Negative Emotionality

Negative emotionality combines the propensity to experience negative emotions such as anxiety, emotional lability, and excessive worry with a disposition to be involved in antagonistic interpersonal interactions (Tellegen, 1982). High scorers describe themselves as unable to effectively regulate mood states when confronted with stressors (Watson & Clark, 1984). Though “negative emotionality” is often used interchangeably with “negative affect” in the literature, it is important to distinguish these two terms.

Negative emotionality is a personality trait, whereas negative affect is a state involving distress or depressive symptoms (Elkins, King, McGue, & Iacono, 2006).

Negative emotionality emerges as a trait linked with alcoholism, and research indicates that alcoholics score high on a variety of different measures of negative emotionality (Sher & Trull, 1994). In particular, studies have shown that negative emotionality is linked with onset of alcohol disorders (Elkins et al., 2006) as well as positively related to alcohol use frequency and problems (Myers, Aarons, Tomlinson, & Stein, 2003). Additionally, some research suggests that children of alcoholics, who are at high risk for developing substance use disorders, exhibit higher levels of negative emotionality compared to control groups (Sher, Walitzer, Wood, & Brent, 1991).

Similarly, in eating disorder research, negative emotionality has been positively associated with disordered eating attitudes and behaviors (Casper, Hedeker, & McClough, 1992). Studies have found negative emotionality to be a significant cross-sectional (Leon, Fulkerson, Perry, & Cudeck, 1993) as well as longitudinal predictor of disordered eating symptoms and full syndrome eating disorders for both adolescents and adults (Ghaderi & Scott, 2000; Leon, Fulkerson, Perry, Keel, & Klump, 1999). It appears to be binge eating or bulimic symptoms in particular, rather than general eating pathology, which are specifically linked to negative emotionality (Stice, 2002). Preliminary research indicates that negative emotionality persists after long-term recovery from bulimia nervosa (Stein et al., 2002).

Impulsivity

Impulsivity appears to be a common risk factor for both alcohol dependence and binge eating disorder (Fischer et al., 2004). To date, there is no clear, consistent or

comprehensive definition of impulsivity in the literature (Parker, Bagby, & Webster, 1993). However, most definitions of impulsivity contrast impulsive behavior with planned behavior. Impulsivity has been described as including behaviors that: occur without forethought or conscious deliberation, are rash, lack adequate planning, and typically occur in the presence of appealing stimuli (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001).

Impulsivity is one of the personality dimensions most consistently associated with alcohol use disorders, and has been linked both concurrently and prospectively with onset of use and escalation to problematic abuse (Sher, Bartholow, & Wood, 2000; Sher & Trull, 1994). Alcohol abuse is associated with lack of perseverance, sensation-seeking, and the tendency to act urgently when experiencing distress and negative affect (Miller, Flory, Lynam, & Leukefeld, 2003). Moreover, individuals with alcohol use problems evidence increased impulsivity on both behavioral and self-report measures when compared to controls (Lane, Cherek, Rhoades, Pietras, & Tcheremissine, 2003). Studies have also shown that impulsivity in childhood and adolescence increases the risk for the development of alcohol use problems in later life (Bates & Labouvie, 1995).

Impulsivity has also been shown to be associated with eating disorders. In particular, personality traits associated with BN include high impulsivity, novelty-seeking, and sensation-seeking (Cassin & von Ranson, 2005; Vitousek & Manke, 1994). Analogous to findings from the field of substance abuse, a recent study found bulimic symptoms to be correlated with the tendency to act rashly while under distress, lack of perseverance, and lack of premeditation (Claes, Vandereycken, & Vertommen, 2005). To date, little is known about impulsivity in BED. Preliminary evidence suggests that there

is a positive correlation between BED and scores on measures of impulsivity (Nasser, Gluck, & Geliebter, 2001). Additionally, women who describe themselves as impulsive are more likely to engage in periodic binge eating than women who describe themselves as less impulsive and cautious (de Zwaan et al., 1994).

Relatively little research has investigated potential personality associations between BED and substance dependence. Investigating the relationship between personality and these two disorders is a particularly fascinating area of study due to certain similar behavioral manifestations of both disorders. For instance, both involve a loss of control during overconsumption of a particular substance. Moreover, both disorders can be construed as a type of escapism. For instance, some individuals drink to cope with distress, and coping with distress is positively related to alcohol use (Cooper, 1994). Similarly, it is also posited that binge eating is a coping mechanism, in that an individual binge eats in order to ease distress (Arnow, Kenardy, & Agras, 1992). The loss of control and escapism behaviors bear resemblance to the personality characteristics of impulsivity and negative emotionality, respectively. Perhaps these similarities in behavior result from analogous underlying personality characteristics.

The consideration of personality in BED and substance dependence research has several significant potential benefits. First, personality may be a critical component in understanding etiology, as personality characteristics are important individual level risk factors for both eating disorders and substance use disorders (Sher & Trull, 1994; Vitousek & Manke, 1994). Personality configurations may also contribute additional information beyond DSM-IV diagnostic classification. For example, a recent study found that the addition of personality information provided incremental validity in predicting

eating disorder symptoms, adaptive functioning, and etiological factors (Westen & Harnden-Fischer, 2001). Additionally, assessing personality traits in eating disorders may be beneficial in predicting response to different treatment modalities and ultimate prognosis. For example, trait impulsivity has been linked with poorer response to treatment and earlier termination of therapy for BN (Keel & Mitchell, 1997), while treatment matching based on personality characteristics has resulted in improved success for substance abuse (Conrod et al., 2000). Consequently, treatment programs and psychotherapy models may see improved outcomes by directly targeting maladaptive personality characteristics.

Study Rationale

If eating disorders are commonly treated from an addiction perspective and if they are to be validly conceptualized as addictions, it is imperative to explore the degree to which there are associations between eating disorders and chemical substance addictions. As certain personality characteristics may be associated with addictive behaviors, one potential link between the two disorders is shared personality correlates.

To date, few studies have examined whether substance addictions and behavioral addictions share common personality correlates, and only one study has examined associations among personality, binge eating symptoms, and alcohol use problems (Fischer et al., 2004). Results from this study provided preliminary support for impulsivity as a risk factor for both alcohol abuse and binge eating symptoms. However, the authors assessed symptoms of binge eating and alcohol abuse in a university sample, rather than comparing diagnostic groups. Moreover, eating disorder symptoms were determined via self-report questionnaires, and not diagnostic interviews.

Hypotheses

Based upon existing research findings (Sher & Trull, 1994; Pryor & Wiederman, 1996), it is hypothesized that: (1) individuals with BED or AD will demonstrate higher levels of impulsivity than controls. Furthermore, it is expected that individuals with AD will evidence greater impulsivity than those with BED. Although individuals with substance dependence disorders appear to have comparable levels of impulsivity to individuals with BN (de Silva & Eysenck, 1987), preliminary evidence suggests that BED involves less impulsive behavior than BN (Kirkley et al., 1992). Therefore, it follows that BED will involve less impulsivity than AD; (2) individuals with BED or AD, relative to controls, will manifest elevated rates of negative emotionality. As both BED and AD have been associated with heightened levels of negative emotionality, it is expected that individuals with either of these disorders will score comparably on this trait; (3) women with comorbid BED and AD will report higher levels of impulsivity and negative emotionality than the BED-only and AD-only groups. Women with comorbid BN and alcohol use disorders have reported higher trait impulsivity than women with only BN (Loxton & Dawe, 2001); thus it is hypothesized that women with comorbid BED and AD will show higher impulsivity and negative emotionality than the other study groups (see Appendix A for a tabular summary).

Method

Study Design

The project was a cross-sectional comparison of personality characteristics between community-based women with lifetime diagnoses of AD, BED, comorbid BED and AD, and a control group with no lifetime eating or substance use disorder.

Participants

The sample was composed of: an alcohol dependence group ($n = 31$), a binge eating disorder group ($n = 34$), a comorbid group ($n = 25$), and a control group ($n = 45$). Inclusion criteria required all participants to be female, 18 years or older, fluent in English, able to read and write, and to be free of current psychosis. Individuals with AD who had other comorbid substance dependence problems (i.e., drug dependence) were not excluded. Of the 241 individuals screened for eligibility, 102 met study criteria.

Procedure

Potential female participants were ascertained from the Calgary community via three recruitment strategies: (1) posters at community locales, including gyms, malls, health centres, the university, and message boards, (2) advertisements in local publications and (3) in-person recruitment at the Mustard Seed and the Salvation Army Residential Services, which are local homeless shelters. For the former two recruitment methods, interested individuals contacted the Eating Behaviors Research Laboratory regarding participation, were read a standardized study description and were screened for eligibility. If the caller met criteria for one of the study groups, she was invited to schedule an in-person assessment. Prior to the in-person assessment, participants were mailed a consent form and a package of self-report questionnaires, which they were asked to bring with them to the assessment. At the assessment, participants signed a copy of the consent form and then completed a structured interview. The procedure varied slightly for participants from the Mustard Seed and the Salvation Army. At these locations, women identified by staff members as having current or past alcohol problems were approached in person and asked if they would be interested in participating in a study on

women and addictions. If interested, they were read a standardized study description and screened for eligibility. Eligible participants read and signed the consent form and completed the diagnostic interview and questionnaires on-site. All participants were debriefed about the purpose of the study upon completion, and received \$10 and personalized personality feedback for their participation. Approval for this project was received from The University of Calgary Conjoint Faculties Research Board.

Measures

Questionnaires assessing personality and impulsivity were employed to compare levels of negative emotionality and impulsivity across the study groups. Anxiety and depression questionnaires were included to control for these constructs. Substance abuse and eating pathology questionnaires were used to provide for a continuous index of problem severity (see Appendix B for a more detailed description of all measures).

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID, First, Gibbon, Spitzer, & Williams, 1996) The SCID is a structured interview used for making DSM-IV Axis I diagnoses. This study employed the psychotic screen and the substance use, eating, mood and anxiety disorder modules.

Multidimensional Personality Questionnaire (MPQ, Tellegen, 1982). This 198-item measure of normal personality dimensions has three higher-order scales (Positive Emotionality, Negative Emotionality, and Constraint) and 11 primary scales (Well-being, Social Potency, Achievement, Social Closeness, Stress Reaction, Alienation, Aggression, Control/Impulsivity, Harm Avoidance, Traditionalism, Absorption). The Negative Emotionality higher-order scale and the Stress Reaction primary scale were used in the primary analyses for this study.

Barratt Impulsiveness Scale-11 (BIS-11, Patton et al., 1995). The BIS-11 is a 30-item instrument that asks individuals to rate the degree to which a number of statements related to impulsiveness describes their own behavior. The BIS-11 total score was used in the present study.

Impulsive Behaviors Scale (IBS, Rossotto, Yager, & Rorty, 1994). The IBS is a 25-item measure assessing a variety of different impulsive behaviors. The overall score gives a global level of impulsive behaviors. Four items pertaining to eating disorder or substance abuse symptoms (questions 1, 4, 9, 17) were omitted from the total score to avoid conflating the independent variables with the dependent variables.

Dickman Impulsivity Inventory (DII, Dickman, 1990). The DII is a 46-item questionnaire answered in true/false format. The 14-item Dysfunctional Impulsivity subscale was used in the present study.

Beck Depression Inventory (BDI-II, Beck, Steer, & Brown, 1996). The BDI-II is a 21-item questionnaire that assesses DSM-IV criteria for depressive disorders and provides a quantitative index of depression severity.

Beck Anxiety Inventory (BAI, Beck, Epstein, Brown, & Steer, 1988). The BAI is a 21-item instrument assessing subjective, somatic, and panic-related symptoms of anxiety. It provides a quantitative index of severity of anxiety symptoms.

Alcohol Use Disorders Identification Test (AUDIT, Allen, Litten, Fertig, & Babor, 1997). The AUDIT is a 10-item, Likert-type questionnaire for the screening of alcoholism based on alcohol consumption, drinking behavior, adverse reactions, and alcohol-related problems.

Drug Abuse Screening Test (DAST, Skinner, 1982). The DAST is a 20-item questionnaire that yields a quantitative index of the severity of drug-related problems.

Eating Disorder Examination Questionnaire (EDE-Q, Fairburn & Beglin, 1994). The EDE-Q is a 36 item self-report Likert-style rating scale, which assesses the presence and degree of psychopathology associated with disordered eating over the past 28 days.

Body Mass Index (BMI=Kg/M²): The BMI is a rough measure of adiposity, and is highly correlated with more complex methods of measuring body mass such as skinfold thickness and body density measurements (Garrow & Webster, 1985).

Statistical Analysis

An *a priori* power analysis was performed to determine the number of participants to be sought (see Appendices C and D). In preliminary analyses, demographic variables and scores on the BDI-II and BAI were submitted to independent samples, two-tailed t-tests and chi-square contingency analyses to determine the existence of group differences and to ascertain whether any variables should be entered as covariates. For the primary analyses, the hypotheses required comparisons between the BED, AD, comorbid, and control groups on measures of impulsivity and negative emotionality. Thus, one-way analyses of covariance (ANCOVA) tests, with BDI, BAI, and body mass index (BMI) scores as covariates, were performed for the MPQ Negative Emotionality factor, the Stress Reaction subscale of the Negative Emotionality factor, and each of the impulsivity measures. In exploratory analyses, the other two MPQ factors and the remaining subscales were submitted to ANCOVAs. Significant differences were followed up by post hoc comparisons.

Results

Participant Characteristics

Demographic characteristics and mean BDI-II, BAI, and DAST scores for the four study groups control are presented in Table 1. There were no significant differences between groups on income, educational level, marital status, or age (see Appendix E for descriptive statistics and comparisons for these variables). The groups differed significantly on body mass index (BMI) [$F(3, 128) = 6.08, p < .01$], BDI-II [$F(3, 125) = 24.05, p < .001$], and BAI [$F(3, 126) = 12.46, p < .001$] scores. These variables were used as covariates in subsequent analyses. Ethnic composition also differed across groups [$\chi^2(9, N = 133) = 24.73, p < .01$], and was therefore included as a factor in preliminary analyses. As expected because alcohol use disorders are highly comorbid with drug use disorders (Bucholz, 1999), the groups differed on DAST [$F(3, 126) = 12.46, p < .001$] scores. Lifetime comorbidity rates for selected Axis I disorders are presented in Appendix F. Group differences, as well as means and standard deviations, on eating and alcohol pathology questionnaires appear in Appendix G.

Due to possible group differences in ethnicity, the data were first submitted to a 2 (Ethnicity: Caucasian, non-Caucasian)¹ x 4 (Group: BED, AD, control, dual diagnosis) independent groups factorial ANCOVA, with BDI-II and BAI scores and BMI as covariates. The main effect of ethnicity was not significant for any of the dependent

¹ The ethnicity variable was collapsed into Caucasian versus non-Caucasian for this analysis, due to low observed frequencies in the initial chi-square test. It was necessary to use a Caucasian versus non-Caucasian split, as all other attempts to reduce ethnicity into smaller categories resulted in too great a number of low observed frequencies in chi-square analyses.

variables, nor were there any significant interactions between ethnicity and group². As ethnicity was not related to the dependent variables, it was omitted from subsequent analyses. The data were then analyzed using a one-factor ANCOVA, with the above-noted covariates. Preliminary analyses indicated that the homogeneity of slopes assumption was not violated (see Appendix H), the covariates were modestly to strongly correlated with the dependent variables for the primary analyses (range: .14 - .62) (see Appendix I), and the covariates were not too strongly intercorrelated, as all intercorrelations were below .8 (see Appendix J); thus an ANCOVA analysis was deemed appropriate. Because the three chosen covariates all violated the assumption of homogeneity of variance, a more conservative alpha level of .025 was chosen for all comparisons involving the covariates (Tabachnick & Fidell, 2001).

Impulsivity Scores

In the first ANCOVA analysis, the effect of group on BIS total score was statistically significant, $F(3, 118) = 4.96, p < .01$. Multiple comparisons among adjusted group means were performed using protected t-tests (see Figure 1 and Appendix G for means and standard deviations). The BED group scored significantly higher than the control group, $t(75) = 3.16, p < .01$, and the difference between the AD and control groups approached significance, $t(72) = 1.75, p = .08$. Moreover, there was not a significant difference between the BED group and the AD group, $t(61) = 1.41, p = .16$ in BIS scores. The comorbid group had significantly higher scores than both the control

² Although ethnicity did not differ significantly across groups, examination of mean scores suggests that there was a trend towards the native group scoring higher on measures of impulsivity than the other ethnic groups. This issue merits further exploration in future studies.

group, $t(64) = 3.52$, $p = .001$, and the AD group, $t(50) = 2.28$, $p = .024$, but not the BED group, $t(53) = 1.11$, $p = .27$.

An ANCOVA examining the effect of group on IBS total score indicated significant between-group differences, $F(3, 118) = 21.61$, $p < .001$ (see Figure 1). Multiple comparisons showed that both the AD, $t(72) = 6.47$, $p < .001$, and BED, $t(75) = 2.47$, $p < .01$, groups scored significantly higher than the control group. The AD group had significantly higher scores than the BED group, $t(61) = 3.93$, $p < .01$. Additionally, the comorbid group scored significantly higher than the control, $t(64) = 6.64$, $p < .001$, and the BED groups, $t(53) = 5.28$, $p < .001$, but not the AD group, $t(50) = 1.62$, $p = .11$.

Although no significant group differences arose on the DII measure of dysfunctional impulsivity, this value approached significance, $F(3, 118) = 2.33$, $p = .08$.

Negative Emotionality

The effect of group was not statistically significant on the MPQ Negative Emotionality superfactor, $F(3, 115) = .48$, $p = .71$; however, between-group differences did emerge on the Stress Reaction primary scale, $F(3, 118) = 4.95$, $p < .01$ (see Figure 2 and Appendix G for means and standard deviations). In particular, the BED group scored significantly higher than the control group, $t(76) = 3.62$, $p < .001$, though the AD group did not, $t(73) = 1.34$, $p = .18$. Moreover, there was a significant difference between the BED and AD groups, $t(73) = 2.30$, $p = .02$. The comorbid group scored significantly higher than the control group, and the difference between it and the AD group [$t(51) = 1.85$, $p = .06$] approached significance. However, the comorbid group did not differ significantly from the BED group, $t(54) = .10$, $p = .92$.

Exploratory Analyses

The only covariate significantly related to Positive Emotionality was BDI scores; thus, this was the sole covariate employed in the ANCOVA analysis. No significant group differences emerged on Positive Emotionality, $F(3, 120) = 1.74, p = .16$, nor on any of its subscales (see Figure 2 and Appendix G for means and standard deviations of exploratory analyses). None of the three covariates was significantly related to Constraint, so all were omitted from the analysis. The effect of group was statistically significant, $F(3, 124) = 2.88, p = .04$. The only significant difference to emerge was between the comorbid and the control groups, $t(65) = 2.63, p = .01$, as the comorbid group reported significantly less constraint than the controls.

Examination of the 2 remaining subscales of Negative Emotionality revealed that neither Alienation nor Aggression differed significantly amongst groups [$F(3, 117) = .25, p = .86$ and $F(3, 115) = .96, p = .41$ respectively].

Discussion

The present study examined similarities in personality, namely impulsivity and negative emotionality, across community-ascertained groups of women with BED, AD, comorbid BED and AD, and controls. Although several studies have compared personality traits in women with BN versus women with comorbid BN and substance dependence, this was the first study to (1) examine this topic in women with BED and (2) directly compare an eating disorder group to a substance dependence group.

Consistent with our hypotheses, the BED group tended to score significantly higher on measures of impulsivity than the control group. Of particular significance is the finding that impulsivity was comparable between the BED and AD groups on one

measure of general impulsivity. These findings were contrary to an initial prediction of *lower* levels of impulsivity amongst the eating disordered group compared to the substance dependent group, and are indicative of a considerable relationship ($d = .73$) between impulsivity and binge eating psychopathology relative to controls. While levels of impulsivity were not comparable between the AD and BED groups on the IBS, examination of scale content and consideration of sample characteristics helps explain why the AD may have had elevated scores on this measure. Approximately 37% of the AD sample was recruited from homeless shelters. Due to their adverse life circumstances, it would seem likely for these individuals to have endorsed engaging in the behaviors listed on the IBS (i.e., had sex when did not want to, took too many risks, stole from family or friends, engaged in unsafe sex, took risks/dangerous activity) more often than participants who were not recruited from these shelters.

The second hypothesis was that the AD and BED groups would score higher on the MPQ measure of negative emotionality than the control group. While the data failed to support this hypothesis, the Stress Reaction primary scale, which loads on the Negative Emotionality superfactor, emerged as significantly elevated in the BED group compared to both the control and AD groups. That the Stress Reaction subscale, but not the Negative Emotionality factor, surfaced as a characteristic linked with BED is not surprising in hindsight. Stress Reaction assesses tendency toward worry, irritability and labile affect, while the Negative Emotionality superfactor also includes the Alienation and Aggression primary scales. These latter scales index feelings of mistrust towards others and propensity toward physical aggression. Research has tended to implicate Stress Reaction, more so than Alienation and Aggression, as characteristic of eating

disordered individuals (Stein et al., 2002). Thus, it appears that the Stress Reaction subscale may be more specific than the general construct of negative emotionality.

Contrary to our hypothesis, the BED and AD groups did not have comparable levels of stress reaction. It appears that stress reaction may be a personality trait more specifically associated with eating pathology than substance use disorders, a finding that is consistent with prospective research conducted in these respective fields of study. Longitudinal research assessing risk factors for disordered eating has found negative emotionality to be among the most significant precursors of eating disorder onset (Leon et al., 1999). On the other hand, negative emotionality has not consistently emerged as a strong prospective predictor of alcohol use disorders (Sher, Bartholow, & Wood, 2000). Failure to find high stress reaction amongst the women with AD suggests that this trait may not be a personality characteristic indicative of general addiction-proneness.

Although previous research has suggested that the personality traits of negative emotionality and stress reaction are linked with substance use disorders, studies have often failed to distinguish between the trait of negative emotionality versus negative affect (i.e. actual states of distress and depressive symptoms) (Elkins et al., 2006). Consequently, studies that have attempted to examine the role of negative emotionality in substance addictions may not have controlled for the influence of current negative mood states. A post-hoc analysis comparing study groups on Stress Reaction, but excluding depression and anxiety as covariates, found that both the AD and BED groups had comparable levels of Stress Reaction, and both groups scored significantly higher than the control group. These findings suggest previously reported elevations in negative

emotionality/stress reaction may be attributed to a comorbid diagnosis of depression or anxiety rather than directly linked with alcoholism.

A third hypothesis posited that the comorbid group would exhibit a pattern of greater impulsiveness and negative emotionality compared to the other three groups. The data partially supported this hypothesis. On both the BIS-II and the IBS, the comorbid group had significantly higher impulsivity scores than the control group, and comparable to the single-diagnosis group (BED or AD) that scored highest on the respective impulsivity measure. Also of interest is the finding that the comorbid group had significantly lower MPQ Constraint scores than the control group. Although not directly related to impulsivity, low Constraint scores suggest lack of restraint and deference, engagement in risky behavior, and unconventionality (Tellegen, 1982). In terms of Stress Reaction, the comorbid group had the second highest score of the four study groups, and was not significantly differentiated from the BED group, which had the highest scores. The lack of distinction between the comorbid group and the BED group may be due to the common eating pathology between the two groups. Thus, these results appear to support the specificity of the link between the personality trait of stress reaction and eating pathology, rather than alcohol pathology.

Overall, elevated levels of impulsivity and stress reaction characterized the comorbid group. It may be that in women who already have eating disorders, higher impulsivity may predispose to comorbid alcohol dependence. Conversely, heightened impulsivity amongst substance dependent women may increase their risk for BED. Thus, binge eating and excessive drinking may be persistent consequences of impulsive or dysregulatory behavior in these women. In terms of order of onset, preliminary research

indicates that there is no typical chronology between the onset of an eating disorder and alcohol dependence (Bulik et al., 1997).

The overarching aim of the study was to explore the degree to which there are associations between BED and alcohol and to determine whether evidence exists for BED to be conceptualized as an addiction. Results suggest that BED is quite comparable to chemical substance addictions in terms of impulsivity. The finding that impulsivity is one of the defining characteristics of BED is meaningful given that this personality trait appears to be a hallmark of most substance addictions (Sher & Trull, 1994). However, the presence of heightened impulsivity in BED does not necessarily imply that BED can therefore be conceptualized as an addiction, as other disorders (e.g., borderline personality disorder and attention-deficit/hyperactivity disorder) also evidence high levels of impulsivity. Moreover, while the personality characteristic of stress reaction also surfaced as a prominent trait in BED this was not the case for the AD group, which suggests that there are differences between these disorders with respect to certain personality characteristics. To further investigate claims of BED as a behavioral addiction, future research will need to investigate other possible similarities between it and chemical substance addictions, such as common neurobiology.

Alternatively, rather than attempting to fit BED within an addiction framework, the notion of BED as an impulse-control disorder (ICD) is worth consideration. ICD is a diagnostic category within the DSM-IV that includes a variety of behaviors wherein impulsivity is the core symptom domain (APA, 2000). According to the DSM-IV, ICDs are characterized by: failure to resist an impulse act that is harmful to oneself or others, heightened sense of tension prior to engaging in the act, sense of relief immediately after

act is completed, and feelings of guilt or remorse at having committed the act. From this perspective, the marked impulsivity present in BED may lead to an inability to control irresistible impulses to binge eat. The definition of ICDs also highlights the notion of affective disturbances associated with the impulsive behaviors. Consistent with this criterion, results from the current study suggest elevated stress reaction in BED. This dispositional tendency toward stress reaction may increase risk for engaging in binge eating episodes. Previous studies have found that individuals with eating disorders often describe bingeing being precipitated by tension, while the actual act of bingeing temporarily relieves this heightened tension or anxiety (Arnow et al., 1992). Overall, the added advantage of conceptualizing BED as an ICD is that it captures the key personality traits (i.e. both impulsivity and stress reaction) implicated in this eating disorder.

Two lines of evidence for a possible link between BED and ICDs are rates of comorbidity and neurobiological findings. First, in terms of comorbidity, a recent study found that of women with a current diagnosis of BN, 17.3% also met criteria for a current ICD, versus 15.4% with a comorbid substance use disorder (Keel, Mitchell, Miller, Davis, & Crow, 2000). These preliminary findings suggest that eating disorders may have similar, if not higher, rates of comorbidity with ICDs than substance use disorders. Second, with regard to neurobiology, researchers have suggested that individuals with ICDs may have a neurochemical abnormality involving low brain serotonin levels (McElroy, Hudson, Pope, Keck, & Aizley, 1992). Alterations in brain serotonergic functioning have also been implicated in the etiology of eating pathology (Steiger, 2004).

Regardless of how best to conceptualize BED, its association with impulsivity suggests that it is critical to address this construct in assessment and treatment initiatives.

It is important for clinicians to assess overall severity of impulsivity as well as specific , impulsive behaviors that the client may engage in (other than binge eating). Determining the severity of impulsivity is crucial as greater levels of impulsivity have been found to predict premature treatment termination (Agras et al., 2000). Assessing specific impulsive behaviors is useful in order to determine whether impulsive behaviors are externally directed behaviors such as theft, unsafe sex, and reckless driving, or internally directed behaviors, such as self-harm. In treatment, addressing impulsivity and the ways in which it contributes to maintenance of binge eating symptoms may contribute to more effective treatment outcomes. Preliminary research in the substance abuse field has shown that treatment that specifically targets impulsivity is more effective at reducing substance use than standard motivational treatment (Conrod et al., 2000). Binge eating disorder treatment therefore needs to incorporate specialized interventions that specifically focus on impulsivity. Steiger, Lehoux, & Gauvin (1999) have proposed that impulsivity is best dealt with via (1) adjunctive pharmacotherapy and (2) interventions aimed at enhancing impulse-control skills and self-regulation. One medication class that shows promise in treating impulsivity symptoms is selective serotonin reuptake inhibitors (SSRIs), which directly target serotonin hypofunction (Hollander & Stein, 2006). With regard to psychotherapy, aspects of dialectical behavioral therapy, a treatment developed for borderline personality disorder, may be useful in BED treatment. Specifically, components addressing impulse-control skills and self-regulation may be particularly relevant for BED populations.

Strengths and Limitations

This study boasts several methodological strengths over previous research in the area. First, the study employed a community-based sample. Past research examining personality characteristics in BED and AD has often studied clinical samples; however, such samples are not always representative of the general population with that disorder (Berkson, 1946) and results may consequently lack generalizability. Second, the study used a structured interview to determine whether participants met DSM-IV criteria for the four study groups, whereas past research has relied solely on self-report questionnaires, which may inflate rates of pathology (Fairburn & Beglin, 1994). Clinical interviews are necessary for accurate diagnosis of Axis I disorders. Third, three measures of impulsivity were included in this study. Given the ambiguity surrounding the precise nature and definition of impulsivity, the use of multiple measures was particularly important.

Despite the study's methodological strengths, a discussion of its limitations is warranted. First, lack of a psychiatric control group makes it difficult to determine the specificity of particular personality traits to BED or AD. It is possible that such personality characteristics are present in a range of different disorders. Second, the cross-sectional design of the study restricts comparisons to correlations between the disorder and the variable of interest, and does not allow for testing whether such variables are risk factors. Thus, it is impossible to determine whether impulsivity or stress reaction predate BED and AD or are consequences of the disorder. However, it is important to note that personality is conceptualized as a relatively stable construct and longitudinal research in the eating disorder field has found evidence for the existence of personality predictors of BN pathology prior to its onset (Leon et al., 1999; Ghaderi & Scott, 2000). Nonetheless,

prospective research, particularly with BED, is needed to provide additional support for the temporal sequencing of personality dimensions with outcome diagnoses. Third, as with all studies that examine lifetime psychiatric history data are subject to a negative response set, social desirability, and selective memory biases. Use of lifetime diagnoses was necessary in order to allow for adequate statistical power. A final shortcoming of the study was the small number of participants in each study group. This small sample size may have contributed to lack of power and thereby increased the probability of making a Type I error. Larger sample sizes may have revealed additional or even greater between-group differences. However, it is noteworthy that a number of significant differences were found between groups, despite the small sample size.

Conclusions and Future Research

The findings from this study suggest that BED is characterized by marked impulsivity, a personality dimension associated with substance addictions. While it does not necessarily follow that BED can be conceptualized as a behavioral addiction, it does suggest that further research examining other similarities between BED and AD, such as common neural pathways or genetic vulnerabilities, is warranted. Moreover, future investigations should also consider the inclusion of psychiatric control groups in order to determine the specificity of the relationship between BED, AD, and impulsivity. While it is premature to say that BED should be treated from an addiction approach on the basis of the existing literature, it would be valuable to explore whether interventions that focus on changing maladaptive personality characteristics, such as impulsivity, lead to improved outcomes. Finally, another interesting avenue of research is the exploration of similarities

between BED and ICDs. Conceptualizing binge eating within the ICD category may promote novel ways of investigating and treating this disorder.

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Table 1

Comparison of Study Groups: Participant Characteristics

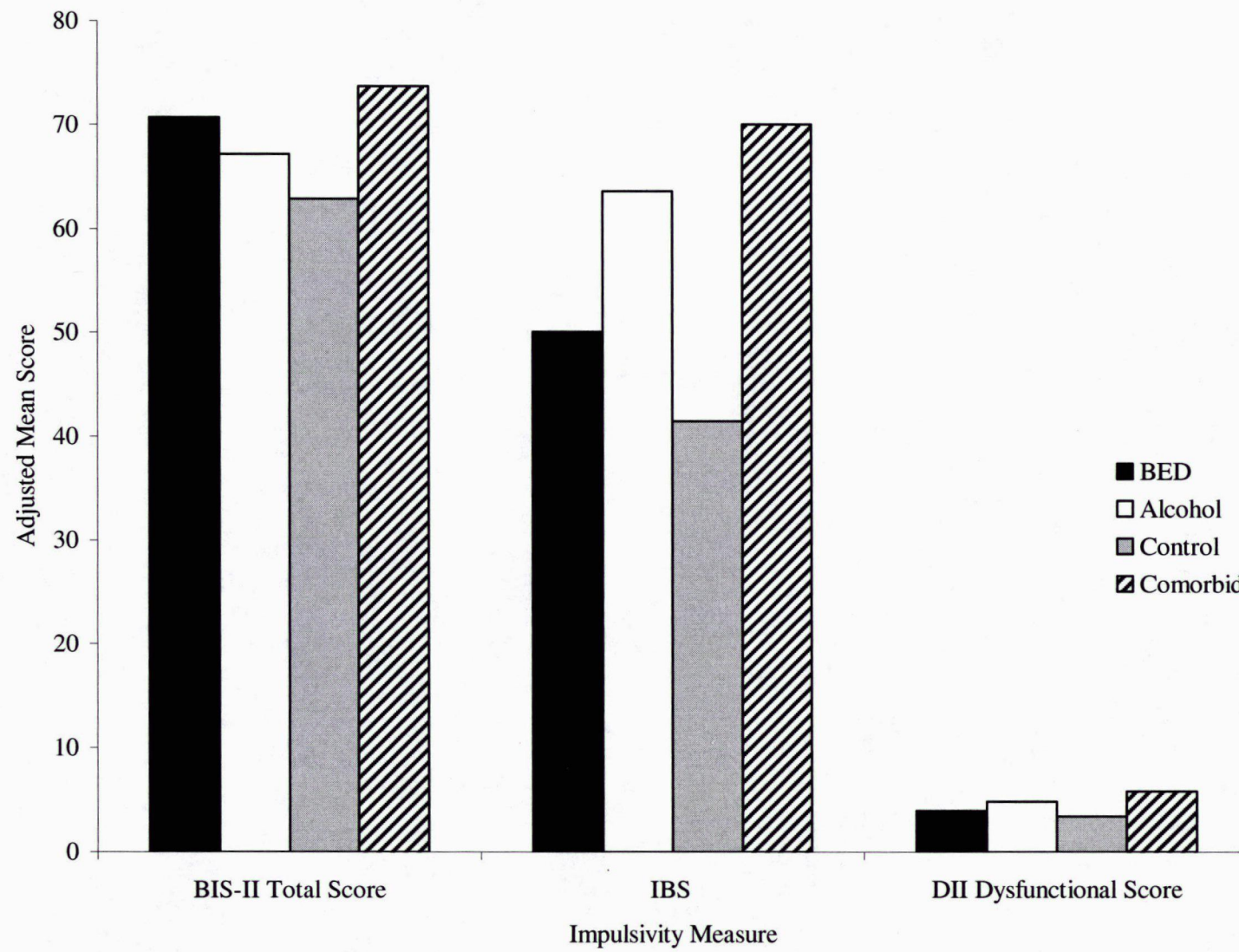
Variable	BED (n = 34)		AD (n = 31)		Control (n = 45)		BED and AD (n = 25)	
	<i>M(SD)</i>	%	<i>M(SD)</i>	%	<i>M(SD)</i>	%	<i>M(SD)</i>	%
Ethnicity								
Caucasian		79.41		79.41		68.89		88
Asian		8.82		3.22		13.33		0
Native		0		19.35		0		4
Other		11.76		12.90		17.78		8
BMI	30.87 (9.37)		25.66 (6.32)		25.02 (6.32)		31.82 (8.19)	
BDI-II	19.63 (1.89)		18.28 (1.98)		5.00 (1.63)		26.85 (2.31)	
BAI	13.08 (1.98)		19.34 (2.08)		6.07 (1.70)		21.25 (2.42)	
DAST	1.27 (.68)		8.75 (.71)		.56 (.58)		5.68 (.83)	

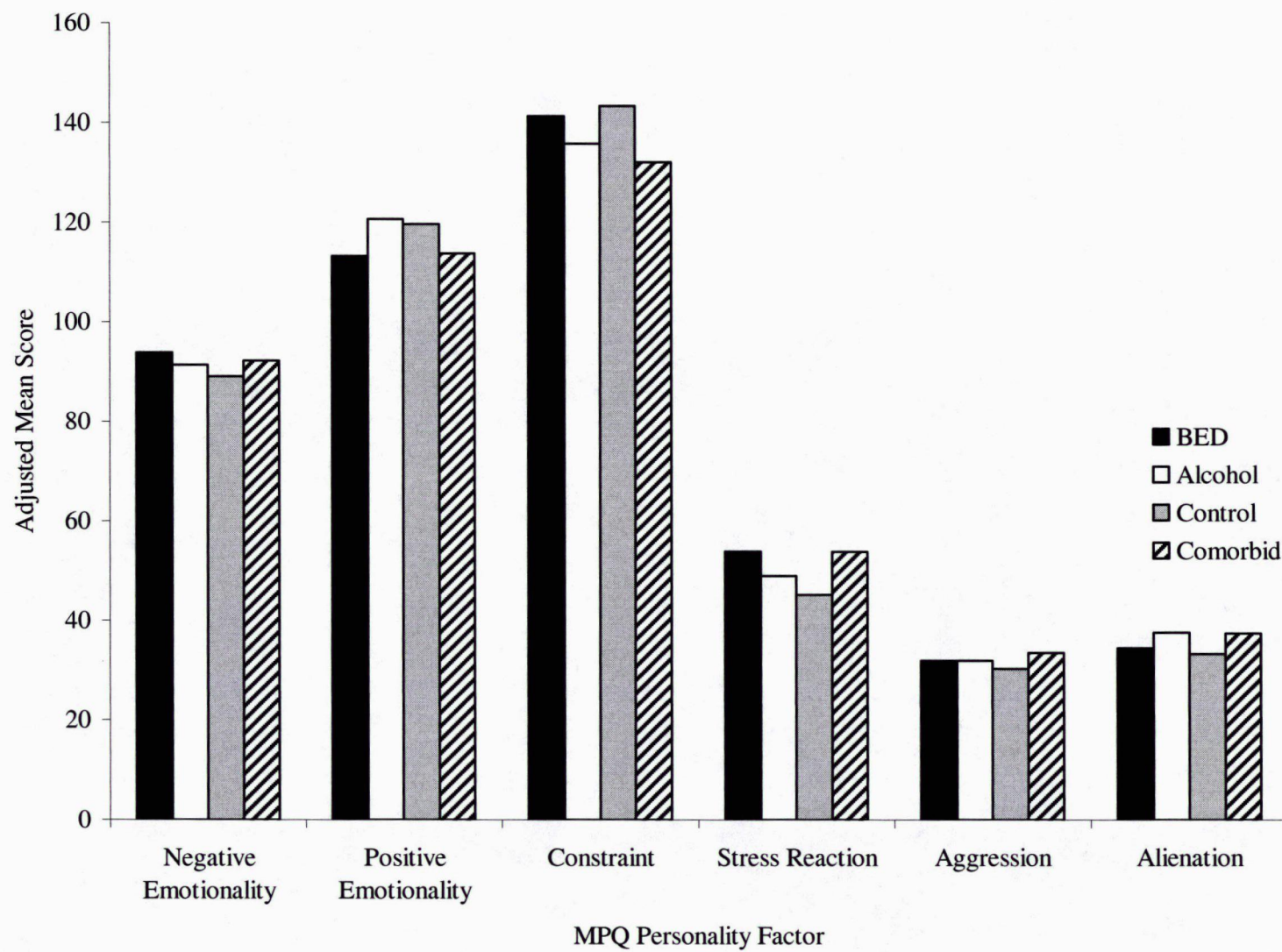
Note. BED = Binge Eating Disorder; AD = Alcohol Dependence; BMI = Body Mass Index; BDI-II = Beck Depression Inventory-II; BAI = Beck Anxiety Inventory; DAST = Drug Abuse Screening Test. Descriptive statistics are presented only for the variables in which there were significant between-group differences. See Appendix E for descriptive statistics of remaining demographic variables.

Figure Captions

Figure 1. Comparison of Study Groups on Measures of Impulsivity

Figure 2. Comparison of Study Groups on Multidimensional Personality Questionnaire
Scales





Appendix A
Summary of Study Hypotheses

Summary of Study Hypotheses

Hypothesis	Measure(s)	Prediction
1. Group differences in impulsivity	<ul style="list-style-type: none"> • Barratt Impulsiveness Scale-II • Dickman Impulsivity Inventory • Impulsive Behaviors Scale 	Controls < BED < AD
2. Group differences in negative emotionality	<ul style="list-style-type: none"> • MPQ Negative Emotionality <ul style="list-style-type: none"> • Stress Reaction 	Controls < (BED = AD)
3. Group differences in negative emotionality and impulsivity in comorbid group	<ul style="list-style-type: none"> • Barratt Impulsiveness Scale-II • Dickman Impulsivity Inventory • Impulsive Behaviors Scale • MPQ Negative Emotionality <ul style="list-style-type: none"> • Stress Reaction 	Controls < (BED = AD) < comorbid
4. Describe women binge eating disorder, substance use disorder, and comorbid BED + AD	<ul style="list-style-type: none"> • Remaining MPQ higher order and primary scales 	Exploratory

Note: BED = binge eating disorder; AD = substance dependence; MPQ = Multidimensional Personality Questionnaire. The MPQ assesses overall normal personality functioning. Its three higher order scales (Positive Emotionality, Negative Emotionality, and Constraint) assess, respectively, one's propensity toward experiencing positive emotions, negative emotions, and behavioural inhibition. The 11 MPQ primary scales (Well-being, Social Potency, Achievement, Social Closeness, Stress Reaction, Alienation, Aggression, Control, Harm Avoidance, Traditionalism, Absorption) assess, respectively, one's propensity toward: cheerfulness; leadership abilities; persistence/perfectionism; sociability; moodiness; feeling fairly treated; aggressiveness; impulsivity; risk-taking; rebelliousness; being caught up in imaginative experiences.

Appendix B

Descriptive Information on Measures

Measures

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID, First, Gibbon, Spitzer, & Williams, 1996) This measure is considered by many to be the “gold standard” for diagnostic interviewing for psychopathology and is used for making DSM-IV Axis I diagnoses. This study employed the psychotic screen, as well as the substance use, eating, mood and anxiety disorder modules. The SCID has been found to evidence test-retest reliability in the range of .35 to .78 (dependent on disorder), and convergent validity of .61 to .64 with diagnoses made by psychiatrists during routine care (Basco et al., 2000).

Multidimensional Personality Questionnaire (MPQ, Tellegen, 1982). This 198-item measure of normal personality dimensions has three higher-order scales (Positive Emotionality, or tendency to experience positive emotions; Negative Emotionality, or tendency to experience negative emotions, including anxiety, anger, and resentment; and Constraint, or tendency toward restraint, conventionality, and avoiding risk-taking). The MPQ has 11 primary factor scales (Well-being, Social Potency, Achievement, Social Closeness, Stress Reaction, Alienation, Aggression, Control/Impulsivity, Harm Avoidance, Traditionalism, Absorption), which assess, respectively, one’s propensity toward cheerfulness; leadership abilities; working hard/perfectionism; sociability; moodiness; feeling fairly treated; aggressiveness; risk-taking; rebelliousness; being caught up in imaginative experiences. Each higher-order scale is based on three to four primary scales. The MPQ has three validity scales: Desirable Responding Inconsistency, True Response Inconsistency, and Variable Response Inconsistency, which are measures of response set of style. The MPQ has also demonstrated excellent psychometric properties. Alpha coefficients range from .76 - .89, while test-retest reliabilities over a

30-day interval range from .82 - .90 (Tellegen, 1982). Internal consistency in the current study was also adequate with Cronbach alphas ranging from .80 - .85. Positive Emotionality has been found to be related to Eysenck's Extraversion; Negative Emotionality shares commonalities with Eysenck's Neuroticism, Agreeability, and Emotionality stability factors; and Constraint is similar to Eysenck's Psychoticism factor (Tellegen, 1985). The MPQ has been chosen because: it was developed and standardized using large, nonclinical samples of adults; it yields a comprehensive profile of differences among multiple personality dimensions; traits assessed by this measure appear to reflect consistent and stable patterns of behavior in the adult population; and MPQ traits have been shown to evidence a substantial genetic component (Tellegen et al., 1988).

Barratt Impulsiveness Scale-11 (BIS-11, Patton et al., 1995). The BIS-11 is a 30-item instrument that asks individuals to rate the degree to which a number of statements related to impulsiveness describes their own behavior. The BIS-11 generates a total score, and motor, attention, and non-planning subscale scores. Reported internal consistency coefficients for the total score range from 0.79 to 0.83, while internal consistencies for the subscale scores range from 0.58 to 0.87, for separate populations of undergraduates, substance-abuse patients, general psychiatric patients, and prison inmates (Patton et al., 1995). Internal consistency was good in the present study, with a reported Cronbach's alpha of .84. The BIS-11 total score is significantly correlated ($r = .81$) with the Dysfunctional Impulsivity subscale of the Dickman Impulsivity Inventory and the Impulsivity subscale of the Eysenck Impulsiveness Questionnaire ($r = .45$) (Lane et al., 2003).

Impulsive Behaviors Scale (IBS, Rossotto, Yager, & Rorty, 1994). The IBS is a 25-item measure assessing a variety of different impulsive behaviors, including suicide attempts, driving recklessly, sexual disinhibition, and impulsive spending. The frequency of each behavior is rated on a 5-point Likert-type rating scale (1=Never, 2=Once, 3=On occasion, 4=Sometimes, and 5=Regularly). The overall score gives a global level of impulsive behaviors, where higher scores indicate greater levels of impulsivity. The internal consistency has been found to be acceptable, with a Cronbach's alpha of .69 (Lledo & Waller, 2001). Internal consistency was found to be excellent in the present study, with a reported Cronbach's alpha of .93.

Dickman Impulsivity Inventory (DII, Dickman, 1990). The DII is a 46-item questionnaire answered in true/false format that provides subscales of Dysfunctional and Functional impulsivity. Dickman (1990) reported Cronbach's alphas of 0.83 and 0.86 for the Functional and Dysfunctional impulsivity scales respectively. Internal consistency was also good in the current study, with a Cronbach alpha of .83 for the dysfunctional scale. Both subscales have been found to be significantly correlated with other measures of impulsivity, including the Narrow Impulsivity Scale, the Personality Research Form Impulsivity Scale, and the Eysenck Personality Inventory Extraversion scale, with correlations ranging from .14 to .34 for the Functional subscale, and .51 to .73 for the Dysfunctional subscale (Dickman, 1990).

Beck Depression Inventory (BDI-II, Beck, Steer, & Brown, 1996). The BDI-II is a 21-item questionnaire that assesses DSM-IV criteria for depressive disorders, and provides a quantitative index of depression severity. The revision of the original BDI was undertaken to assess more fully the DSM-IV criteria for depression. Convergent validity

between the two instruments is reported at .93 ($n=191$). Stability over time is reported to be high with a test-retest correlation of .93 ($n=26$) on a one-week repeat of the test. Tests of internal consistency resulted in alpha coefficients of .93 ($n=120$) for a sample of college students and .92 for a sample of outpatients ($n=500$) (Beck et al., 1996). Similarly, Cronbach's alpha for the current study was .95.

Beck Anxiety Inventory (BAI, Beck, Epstein, Brown, & Steer, 1988). The BAI is a 21-item instrument assessing subjective, somatic, and panic-related symptoms of anxiety. It provides a quantitative index of severity of anxiety symptoms. The BAI has high internal consistency ($\alpha = .92$) and a one-week test-retest reliability of .75. The measure has been found to successfully discriminate anxious diagnostic groups from nonanxious diagnostic groups. Moreover, it is moderately correlated with the Revised Hamilton Anxiety Rating Scale ($r = .51$) (Beck et al., 1988). The present study also showed excellent internal consistency for the BAI total score, with a Cronbach's alpha of .95.

Alcohol Use Disorders Identification Test (AUDIT, Allen, Litten, Fertig, & Babor, 1997). The AUDIT is a 10-item, Likert-type response questionnaire for the screening of alcoholism from the areas of alcohol consumption, drinking behavior, adverse reactions, and alcohol-related problems. Previous research has reported coefficient alphas ranging from .75 to .94 (Allen, Litten, Fertig, & Barbor, 1997). The current study found a Cronbach's alpha of .94. The AUDIT also correlates highly with the Michigan Alcohol Screening Test ($r = .88$) and the CAGE ($r = .78$) (Allen et al., 1997).

Drug Abuse Screening Test (DAST, Skinner, 1982). The DAST is a 20-item questionnaire that yields a quantitative index of the severity of drug-related problems.

The DAST has excellent internal consistency with a reported alpha of .92 (Cocco & Carey, 1998). The present study also found good internal consistency, with a Cronbach's alpha of .95. Strong relationships have emerged between scores on the DAST and measures of lifetime problems with drugs and recent drug involvement ($r = .33$ to $.59$). Additionally, the DAST is significantly correlated with the Michigan Alcohol Screening Test total score ($r = .52$) and the Addiction Severity Index composite score ($r = .33$) (Cocco & Carey, 1998).

Eating Disorder Examination Questionnaire (EDE-Q, Fairburn & Beglin, 1994).

The EDE-Q is a 36 item self-report using a Likert-style rating scale. It assesses the presence and degree of specific psychopathology associated with eating disorders over the previous 28 days. The EDE-Q consists of four subscales: Eating Concern, Restraint, Shape Concern, and Weight Concern (Cooper, Cooper & Fairburn, 1989). The subscales show excellent internal consistency, with Cronbach alpha coefficients ranging from .78 to .93 (Luce and Crowther, 1999). Moreover, the present study showed good internal consistency for the subscales with Cronbach alphas of .82 for Restraint, .84 for Eating Concerns, .85 for Weight Concerns and .92 for Shape Concerns.

Appendix C

Power Analysis

The estimated total sample size needed was 180, or 45 participants in each of the four groups (BED, AD, Control, and Comorbid groups). This estimate was based on a sample size calculation for two-tailed analysis of variance for four groups with alpha set at 0.05, power at 0.80, and anticipating a medium effect size ($f = 0.25$) (Faul & Erdfelder, 1992). A medium effect size was selected in the absence of published data specifically regarding group differences in impulsivity and negative emotionality between binge eating disorder and substance use disorder.

Individuals with binge eating behaviors evidence a medium effect size ($r = .32$) for negative emotionality on the MPQ (Klump, McGue, & Iacono, 2002). Individuals with alcohol dependency have also demonstrated medium effect sizes for negative emotionality on the MPQ ($d = .61$) (Conway, Swendsen, Rounsaville, & Merikangas, 2002).

Previous research has found predominantly medium effect sizes between measures of impulsivity and disordered eating and alcohol use (see Appendix D below for a summary). Specifically, in community-based samples investigating impulsivity, research has found effect sizes ranging from .38 to .45 for bulimic symptomatology (Fischer et al., 2000; Lledo & Waller, 2001), between .13 to .24 for binge eating behavior (Benjamin & Wulfert, 2005; Fischer et al., 2004), and between .26 to .40 for substance abuse (Benjamin & Wulfert, 2005; Fischer et al., 2004). In research examining impulsivity with individuals meeting the diagnostic criteria for a clinical diagnosis, effect sizes for BED range from .45 to .98 (Nasser et al., 2004), and those for substance abuse or dependence range from .07 to 1.51 (Eensoo, Paaver, Harro, & Harro, 2005;

Tcheremissine et al., 2003). Although past research indicates that there is a range of effect sizes, the data generally support a medium effect size (see Appendix D for table).

Appendix D

Effect Sizes between Measures of Impulsivity and Binge Eating and Substance

Use/Abuse

Effect Sizes between Measures of Impulsivity and Binge Eating and Substance Use/Abuse

Study	Sample	Impulsivity Measure	Eating Disorder/Alcohol Use Measure	Effect size
1. Fischer et al. (2004)	Undergraduate university women	<ul style="list-style-type: none"> • UPPS Impulsivity Scale 	<ul style="list-style-type: none"> • Eating Disorder Examination Questionnaire • Drinking Styles Questionnaire 	<p>$r = .24$ between binge eating and impulsivity score</p> <p>$r = .40$ between alcohol abuse and impulsivity score</p>
2. Fischer et al. (2003)	Undergraduate university women	<ul style="list-style-type: none"> • UPPS Impulsivity Scale • Revised NEO Personality Inventory 	<ul style="list-style-type: none"> • The Bulimia Test-Revised 	<p>$r = .45$ for bulimic symptoms and impulsivity scores</p>

Study	Sample	Impulsivity Measure	Eating Disorder/Alcohol Use Measure	Effect size
3. Nasser, Gluck, & Geliebter (2004)	Community-recruited BED women versus obese controls	• Barratt Impulsivity Scale-II total score	• Questionnaire of Eating and Weight Patterns	$r = .38$ for total impulsivity score
4. Tcheremissine et al. (2003)	Community-recruited males and females with past substance dependence versus controls	• Barratt Impulsivity Scale-II total score	• SCID interview assessing DSM-IV criteria for past substance dependence	$d = .86$ for total impulsivity score
5. Benjamin & Wulfert (2005)	University undergraduate women	• Eysenck Impulsiveness Questionnaire	<ul style="list-style-type: none"> • Questionnaire on Eating and Weight Patterns-Revised • CORE Alcohol and Drug Survey 	$r = .13$ for binge eating $r = .26$ for drinking

Note: BED = Binge Eating Disorder; SCID = Structured Clinical Interview for DSM-IV diagnoses; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders.

Appendix E

Comparison of Study Groups: Details of Demographic Variables

Comparison of Study Groups: Details of Demographic Variables

Variable	BED (n =34)		AD (n = 31)		Control (n = 45)		Comorbid (n = 25)		F/χ^2	df	p
	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%			
Age (yrs.)	34.94 (12.19)		39.81 (12.65)		37.31 (15.67)		38.84 (10.87)		.81	3, 131	.49
Education									18.22	12	.11
Grade 6 or less		0		3.45		0		4			
Grade 7-12		0		10.34		4.44		12			
High School		11.76		31.03		8.89		12			
Part University		38.23		20.69		31.11		20			
University		50		34.48		55.56		52			
Marital Status									16.76	15	.33

	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%	<i>M</i> (<i>SD</i>)	%	<i>F</i> / χ^2	<i>df</i>	<i>P</i>
Married/CL		35.29		27.59		42.22		24			
Widowed		0		6.90		6.67		0			
Divorced		17.64		27.59		11.11		32			
Never Married		47.06		37.93		37.78		44			
Income (\$)									17.57	18	.48
<10,000		12.50		20		10		5.56			
10,000-20,000		6.25		20		7.50		27.78			
21,000-40,000		21.88		24		17.50		38.89			
41,000-60,000		25		12		20		11.11			
61,000-80,000		15.63		12		20		11.11			
80,000-100,000		6.25		4		12.50		0			
>100,000		12.5		8		12.50		5.56			

Note. BED = Binge Eating Disorder; AD = Alcohol Dependence; CL = Common-Law.

Appendix F

Comparison of Study Groups: Lifetime Axis I Disorders

Comparison of Study Groups: Lifetime Axis I Disorders

	BED	AD	Control	Comorbid	Analyses ^a	
	(n = 34)	(n = 31)	(n = 45)	(n = 25)		
Disorder	%	%	%	%	χ^2	p
Bulimia Nervosa	23.5	0	0	10.5	30.14	<.001
Major Depressive Disorder	55.9	38.7	6.7	72.0	35.44	<.001
Bipolar Disorder	0	3.2	0	5.3	9.52	.02
Dysthymia	0	0	0	10.5	8.93	.03
Panic Disorder	0	3.3	2.2	10.5	5.76	.12
Panic Disorder with Agoraphobia	2.9	9.7	0	10.5	7.74	.05
Agoraphobia without Panic Disorder	0	3.3	2.2	5.3	4.05	.26
Social Phobia	14.7	9.7	2.2	10.5	5.01	.17

Disorder	%	%	%	%	%	<i>p</i>
Specific Phobia	11.8	19.4	8.9	10.5	2.38	.50
Obsessive- Compulsive Disorder	5.9	6.5	4.4	5.3	.39	.94
Posttraumatic Stress Disorder	14.7	29	8.9	36.8	16.18	.001
Generalized Anxiety Disorder	2.9	3.2	0	5.3	5.78	.12
Drug Abuse	14.7	6.5	6.7	16	2.72	.44
Drug Dependence	11.8	41.9	2.2	52.6	29.15	<.001

Note. BED = Binge Eating Disorder; AD = Alcohol Dependence. ^aFor all analyses, df = 3.

Appendix G

Comparisons of Study Groups: Eating and Alcohol Pathology

Comparisons of Study Groups: Eating and Alcohol Pathology

	BED	AD	Control	Comorbid		
	(<i>n</i> = 34)	(<i>n</i> = 31)	(<i>n</i> = 45)	(<i>n</i> = 25)		
Variable	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>F</i>	<i>df</i>
EDE-Q						
Restraint	15.06 (7.18) _a	8.03 (8.62) _b	5.02 (4.90) _b	14.36 (7.78) _a	17.09**	3, 126
Eating Concerns	17.67 (5.61) _a	4.85 (6.51) _b	1.48 (2.09) _c	18.19 (6.93) _a	89.15**	3, 124
Weight Concerns	22.10 (5.13) _a	10.10 (8.46) _b	6.02 (6.27) _c	21.00 (6.34) _a	48.36**	3, 123
Shape Concerns	38.28 (8.19) _a	19.67 (14.95) _b	11.51 (10.97) _c	36.86 (11.97) _a	43.81**	3, 125
AUDIT	3.35 (3.85) _a	19.46 (11.08) _b	2.12 (1.71) _a	13.69 (11.19) _b	42.10**	3, 129

Note. EDE-Q = Eating Disorder Examination Questionnaire; AUDIT = Alcohol Use Disorders Identification Test. Transformed scores were used for measures of eating and alcohol pathology, due to violations of assumptions of normality and homogeneity of variance. However, untransformed means and standard deviations are reported here for descriptive purposes. The same letter in the subscript denotes that groups were similar; different letters in the subscript denote significant differences between groups.

***p* < .001.

Appendix H

Testing Homogeneity of Slopes Assumption

Testing Homogeneity of Slopes Assumption

Interaction between Independent Variable and Covariate	<i>F-test</i> ^a	<i>df</i>	<i>p-value</i>
BIS			
Group * BMI	.51	3, 118	.70
Group * BAI	.15	3, 121	.87
Group * BDI	2.27	3, 120	.08
IBS			
Group * BMI	1.37	3, 118	.25
Group * BAI	.14	3, 121	.94
Group * BDI	1.10	3, 120	.35
DII Dysfunctional Scale			
Group * BMI	1.86	3, 118	.63
Group * BAI	1.23	3, 121	.30
Group * BDI	1.86	3, 120	.14
Negative Emotionality			
Group * BMI	.52	3, 117	.67
Group * BAI	.95	3, 118	.42
Group * BDI	2.22	3, 117	.09
Stress Reaction			
Group * BMI	.48	3, 120	.69

continued

Interaction between Independent Variable and Covariate	<i>F-test</i> ^a	<i>df</i>	<i>p-value</i>
Group * BAI	1.68	3, 121	.17
Positive Emotionality			
Group * BDI	.39	3, 117	.76
Aggression			
Group * BMI	2.05	3, 118	.11
Group * BAI	2.18	3, 121	.09
Group * BDI	2.47	3, 118	.07
Alienation			
Group * BMI	.40	3, 120	.75
Group * BAI	2.19	3, 121	.09
Group * BDI	1.90	3, 120	.13

Note. BMI = Body Mass Index; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BIS = Barratt Impulsiveness Scale-II; DII Dysfunctional Scale = Dickman Impulsivity Inventory Dysfunctional scale; IBS = Impulsive Behaviors Scale.

Appendix I

Correlations among Covariates and Dependent Variables

Correlations between Covariates and Dependent Variables

Covariate	Dependent Variables								
	BIS	DII Dys	IBS	NE	SR	AL	AG	PE	CN
BAI	.46**	.47**	.56**	.50**	.19**	.37**	.23**	-.04	-.007
BDI	.56**	.43**	.53**	.58**	.62**	.47**	.28**	-.30**	-.11
BMI	.23**	.22*	.14	.24**	.28**	.22**	.17	.03	.13

Note. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DAST = Drug Abuse Screening Test; BMI = Body Mass Index; BIS = Barratt Impulsiveness Scale-II; DII Dys = Dickman Impulsivity Inventory Dysfunctional scale; IBS = Impulsive Behaviors Scale; NA = Multidimensional Personality Questionnaire (MPQ) Negative Emotionality; SR = MPQ Stress Reaction; AL = MPQ Alienation; AG = MPQ Aggression; PE = MPQ Positive Emotionality; CON = MPQ Constraint.

** $p < .01$.

* $p < .05$.

Appendix J

Correlations amongst Covariates

Correlations amongst Covariates

Covariate	BAI	BDI
BDI	.71**	
BMI	.13	.25**

Note. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BMI = Body Mass Index.

** $p < .01$

Appendix K

Comparisons of Study Groups: Impulsivity and Multidimensional Personality Questionnaire

Comparisons of Study Groups: Impulsivity and Multidimensional Personality Questionnaire

	BED	AD	Control	Comorbid			
	(<i>n</i> = 34)	(<i>n</i> = 31)	(<i>n</i> = 45)	(<i>n</i> = 25)			
Variable	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>F</i>	<i>df</i>	<i>p</i>
Impulsivity							
BIS total score	70.68 (9.74) _{ac}	67.17 (9.66) _{ab}	62.87 (10.68) _b	73.71 (10.09) _c	4.96	3, 118	<.01
IBS	50.05 (13.54) _a	63.61 (13.36) _b	41.47 (14.92) _c	70.02 (14.01) _b	21.61	3, 118	<.001
DII Dysfunctional scale	3.98 (3.21) _a	4.83 (3.20) _a	3.39 (3.53) _a	5.83 (3.35) _a	2.33	3, 118	.08
MPQ Scale							
Negative Emotionality	93.82 (15.84) _a	91.39 (15.80) _a	89.02 (17.51) _a	92.21 (16.72) _a	.48	3, 115	.71
Positive Emotionality	113.26 (15.05) _a	120.67 (14.00) _a	119.56 (17.09) _a	113.72 (16.27) _a	1.74	3, 120	.16
Constraint	141.25 (16.07) _{ab}	135.75 (16.86) _{ab}	143.23 (16.86) _a	131.97 (18.09) _b	2.88	3, 124	.039
Stress Reaction	54.01 (9.65) _a	48.96 (7.21) _b	45.26 (10.75) _b	53.87 (10.18) _a	4.95	3, 118	.003

continued

Variable	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F</i>	<i>df</i>	<i>p</i>
Aggression	31.94 (8.46) _a	31.93 (9.45) _a	30.33 (8.51) _a	33.59 (8.99) _a	.25	3, 117	.86
Alienation	34.78 (9.95) _a	37.62 (10.92) _a	33.37 (9.88) _a	37.36 (10.36) _a	.96	3, 115	.41

Note. BED = Binge Eating Disorder; AD = Alcohol Dependence; BIS = Barratt Impulsiveness Scale-II; DII = Dickman Impulsivity Inventory; IBS = Impulsive Behaviors Scale; MPQ = Multidimensional Personality Questionnaire. The same letter in the subscript denotes that groups were similar; different letters in the subscript denote significant differences between groups.

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Appendix L

Certifications of Institutional Ethics Review



FACULTY OF MEDICINE | UNIVERSITY OF CALGARY

November 17, 2005

Dr. K.M. von Ranson
Department of Psychology
A 257B
University of Calgary
Calgary, Alberta

OFFICE OF MEDICAL BIOETHICS

Room 93, Heritage Medical Research Bldg
3330 Hospital Drive NW
Calgary, AB, Canada T2N 4N1
Telephone: (403) 220-7990
Fax: (403) 283-8524
Email: omb@ucalgary.ca

Dear Dr. von Ranson:

Re: Personality Characteristics in Binge Eating Disorder and Substance Dependence

Grant ID: 18737

Your request to modify the above-named protocol has been reviewed and approved.

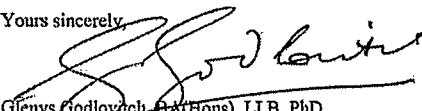
I am pleased to advise you that it is permissible for you to use the revised protocol (inclusion of three questionnaires: The Sociocultural Attitude Towards Appearance questionnaire, An Annual family/household income questionnaire and the Minnesota Eating Behaviours Survey), based on the information contained in your correspondence of November 16, 2005.

A progress report concerning this study is required annually, from the date of the original approval (2005-09-20). The report should contain information concerning:

- (i) the number of subjects recruited;
- (ii) a description of any protocol modification;
- (iii) any unusual and/or severe complications, adverse events or unanticipated problems involving risks to subjects or others, withdrawal of subjects from the research, or complaints about the research;
- (iv) a summary of any recent literature, finding, or other relevant information, especially information about risks associated with the research;
- (v) a copy of the current informed consent form;
- (vi) the expected date of termination of this project.

Thank you for the attention which I know you will bring to these matters.

Yours sincerely,


Glenys Goddard, O.A.(Hons), LLB, PhD
Associate Chair, Conjoint Health Research Ethics Board

GG/cs

c.c. Adult Research Committee

E. Moss (Graduate Student)



FACULTY OF MEDICINE | UNIVERSITY OF CALGARY

2005-09-20

Dr. K.M. von Ranson
Department of Psychology
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3330 Hospital Drive NW
Calgary, AB, Canada T2N 4N1
Telephone: (403) 220-7990
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Email: omb@ucalgary.ca

Dear Dr. von Ranson:

RE: Personality Characteristics in Binge Eating Disorder and Substance Dependence

Grant ID: 18737
Graduate Student: E. Moss

The above-noted research proposal, including the Study Proposal, the Demographic Questionnaire, the MPQ Questionnaire, the BIS-11 Questionnaire, the IBS Questionnaire, the DII Questionnaire, the BDI-II Questionnaire, the BAI Questionnaire, the Brief-DAST Questionnaire, the Audit, the Eating Questionnaire (EDE-Q), the Telephone Screening Questionnaire, the Sample Questions from Structured Clinical Interview for DSM-IV Diagnoses, the UPPS Questionnaire, the Script for Shaw TV Advertisement, the Recruitment Advertisement for Newspapers, the Advertisement Poster, the Pamphlet, the Informed Consent Form, the Letter to Participants and the Feedback Letter has been submitted for Committee review and found to be ethically acceptable.

Please note that this approval is subject to the following conditions:

- (1) access to personal identifiable health information was not requested in this submission;
- (2) a copy of the informed consent form must have been given to each research subject, if required for this study;
- (3) a Progress Report must be submitted by 2006-09-20, containing the following information:
 - i) the number of subjects recruited;
 - ii) a description of any protocol modification;
 - iii) any unusual and/or severe complications, adverse events or unanticipated problems involving risks to subjects or others, withdrawal of subjects from the research, or complaints about the research;
 - iv) a summary of any recent literature, findings, or other relevant information, especially information about risks associated with the research;
 - v) a copy of the current informed consent form;
 - vi) the expected date of termination of this project.
- (4) a Final Report must be submitted at the termination of the project.

Please note that you have been named as a principal collaborator on this study because students are not permitted to serve as principal investigators. Please accept the Board's best wishes for success in your research.

Yours sincerely,

Glenys Godlovitch, BA(Hons), LLB, PhD

Associate Chair, Conjoint Health Research Ethics Board

GG/km

c.c. Adult Health Research Committee Dr. K. Dobson (Information) Research Services E. Moss (Graduate Student)
Office of Information & Privacy Commissioner Ms. G. Corbett (Communications & Fund Development)