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# The Relationship of Impulsivity to Eating Behaviors and Alcohol Consumption

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THE RELATIONSHIP OF IMPULSIVITY TO EATING BEHAVIORS AND  
ALCOHOL CONSUMPTION

A Thesis  
Presented to  
the Faculty of the Department of Psychology  
Murray State University  
Murray, Kentucky

In Partial Fulfillment  
of the Requirements for the Degree  
of Clinical Psychology

by  
Megan Newkirk  
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## Abstract

Previous research has discovered a significant relationship between problematic eating disorder behaviors and alcohol consumption among women. Within this relationship, past studies have found that impulsivity significantly influences the correlation between these behaviors. The primary aim of the present study was to determine if impulsivity influences the relationship between bingeing behavior and alcohol consumption as well as the relationship between purging behavior and alcohol consumption while using a behavioral measure for impulsivity. Participants included 62 undergraduate females who were recruited from Murray State University. The results indicated that there was not a significant correlation between bingeing behavior and alcohol consumption nor between purging behavior and alcohol consumption. The results also showed that impulsivity did not correlate with these behaviors. Using a clinical sample as well as different, more reliable measures may provide more representative results in future studies.

*Keywords:* eating disorder behaviors, alcohol consumption, impulsivity

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## Review of the Literature

Bulimia Nervosa and Binge-eating Disorder are known to be most prevalent in females (APA, 2013). Specifically, the twelve-month prevalence rate of Bulimia Nervosa is 1% to 1.5% among young women. The prevalence is highest among young adults because Bulimia Nervosa is known to peak in older adolescence and young adulthood. For Binge-eating Disorder, the twelve-month prevalence is 1.6% among females, ages 18 and over (APA, 2013). Previous research has provided evidence that there is a positive correlation between eating disorders and substance use, especially alcohol use (APA, 2013). For example, Holderness, Brooks-Gunn, and Warren (1993) discovered that substance use and Bulimia Nervosa were frequently comorbid among women. Other studies have found that individuals with binge eating behaviors are more likely to engage in substance use as well (Ross & Ivis, 1999). Based on these studies, it seems the presence of Bulimia Nervosa and Binge-eating Disorder in females is associated with alcohol consumption. The present study is intended to explore further this association.

Binge-eating Disorder, according to the DSM-5 (APA, 2013), is a disorder in which individuals experience episodes of binge-eating at least once a week. During these binge-eating episodes, individuals eat faster than usual, eat until they feel unpleasantly full, eat large amounts of food when they are not hungry, or eat alone because of the embarrassment over the amount of food consumed. They experience considerable distress in the form of disgust, depression, or guilt after the binge-eating episode. As described, this disorder has both behavioral and emotional components. Although Binge-eating

Disorder is classified as an eating disorder, there also appears to be a behavioral control component in that the individual succumbs to an impulse or urge and quickly feels their eating habits are out of control (APA, 2013). Researchers have found that among preadolescent and early adulthood males and females, Binge-eating Disorder was one of the most common eating disorders present from the DSM-5 (Smink, van Hoeken, Oldehinkel, & Hoek, 2014).

According to the DSM-5 (APA, 2013), Bulimia Nervosa is diagnosed when an individual has continuing episodes of binge eating, like those with Binge-eating Disorder. Those with Bulimia Nervosa also engage in inappropriate compensatory behaviors repeatedly to prevent weight gain from binge eating episodes. Self-induced vomiting, misuse of laxatives or diuretics, fasting, or excessive exercising can all be considered compensatory behaviors. This behavior of binge eating and engaging in inappropriate compensatory behaviors occurs at least once a week for at least three months. The disorder of Bulimia Nervosa is characterized by emotional components as well as behavioral components. There appears to be a cognitive component as well as individuals with Bulimia Nervosa tend to evaluate themselves based on their body shape and weight, which influences their behavior (APA, 2013). Past research has discovered that individuals diagnosed with Bulimia Nervosa have a significant impairment in their psychological well-being when compared to healthy controls (Tomba, Offidani, Tecuta, Schumann, & Ballardini, 2014).

As previously mentioned, there appears to be an association between some eating disorders and substance use disorders. One of these, known as Alcohol Use Disorder, is described as “a problematic pattern of alcohol use leading to clinically significant

impairment or distress” (APA, 2013, p. 490). At least two symptoms occurring within twelve months is required to meet the diagnosis of this disorder. These symptoms can include several or all of the following: consuming alcohol in large amounts in one sitting or over an extended period of time, wanting to control one’s alcohol use, spending lots of time in activities that include alcohol use, frequently craving alcohol, and using alcohol in high-risk situations such as while driving. Individuals with Alcohol Use Disorder let alcohol use adversely affect major obligations in life. These individuals are usually aware of their issue, but continue to consume alcohol anyways (APA, 2013). Like the eating disorders discussed previously, there is a significant behavioral control component to this disorder.

Piran and Robinson (2006) discovered a significant relationship between severe levels of alcohol consumption and binge-eating among female participants in their study. Alcohol consumption was defined as any use of alcohol consumed by an individual. In this study, severe alcohol consumption was operationalized as consuming a drink more than four to five times a week along with consuming more than two drinks in one sitting (Piran & Robinson, 2006). The study consisted of women between the ages of 18 and 25 years. The participants completed the Women’s Health Survey, which is a self-report behavioral survey to identify behaviors such as dieting, binge eating, vomiting, laxative usage, and substance use. The researchers categorized participants based on their responses to items that included “have you ever gone on an eating binge” and admitted to binge-eating without ever dieting or purging. The normal control group category was defined as never participating in behavior that consisted of dieting, bingeing, or purging.

They reported that the participants who were in the Binge Only category consumed alcohol at a higher rate than the control group (Piran & Robinson, 2006).

Piran and Robinson (2006) also ran a second analysis which consisted of four groups. These four groups included women clustered based on their patterns of eating disordered behaviors. The normal control group consisted of women who never participated in dieting, bingeing, or purging behavior. The diet, purge, and no binge group consisted of women who had engaged in dieting and purging behavior, but did not partake in bingeing behavior. The binge, diet, and no purge group consisted of women who had participated in bingeing and dieting behavior, but did not partake in purging behavior. The fourth group, the binge, diet, and purge group, consisted of women who engaged in all three eating disordered behaviors. The researchers discovered that all three of the groups with eating disordered behaviors abused substances such as cocaine, stimulants, and tobacco at a higher rate than the control group (Piran & Robinson, 2006). It seems that perhaps the common link among individuals who abuse substances and binge eat is a propensity for engaging in risky behavior without regard for possible consequences.

Further establishing a link between these various impulse control problems, Anderson, Martens, and Cimini (2005) gave female college students a questionnaire that assessed areas focused on purging behavior, alcohol consumption, and negative alcohol-related consequences. The researchers classified women as part of the purging group if they had vomited or taken laxatives to lose weight within the 30 days prior to the study. The comparison group consisted of participants who were the same age and body mass index as the participants in the purging group but who did not engage in purging

behavior. These researchers discovered that women in the purging group binge drank (defined as five or more drinks in one sitting) more than the comparison group. This study reported that not only did women who were purging binge drink more, but these women were also experiencing more negative consequences when they consumed alcohol. These negative consequences included injury to self and others along with risky sexual behavior (Anderson et al., 2005).

In another similar study, using the same measure, participants who reported engaging in purging behavior were more likely to report heavier alcohol use than participants who were not engaging in purging behavior (Adams & Araas, 2006). The researchers also found that participants who engaged in both purging and consuming alcohol were more likely to report negative consequences than participants who were not purging (Adams & Araas, 2006). Again, this suggests that there is a common thread among various impulse control behaviors.

To better understand the link among these problem behaviors, Luce, Engler, and Crowther (2007) assessed eating disorder behavior and alcohol consumption among female college students. In this study, participants completed The Motives for Drinking measure, which measures four motives: social, coping, mood enhancement, and conformity. Women who were classified with a Binge-eating Disorder reported a greater amount of alcohol consumption on the weekends, and they were more likely to binge drink than women who were not diagnosed with Binge-eating Disorder. Women diagnosed with Bulimia Nervosa were also more likely to engage in alcohol consumption than women who were diagnosed with an Eating Disorder, Not Otherwise Specified. They found that women in both Bulimia Nervosa and Binge-eating Disorder groups were

more likely to drink as a coping mechanism than the other two groups (Luce et al., 2007). This suggests that perhaps the association between various risky and impulsive behaviors is poor coping strategies.

In another study, it was discovered that eating disorders may have an influence on alcohol use disorder, but alcohol use disorder does not appear to have an influence on eating disorders (Franko, Dorer, Keel, Jackson, Manzo, & Herzog, 2005). Women who pursued help for their eating disorder at clinics from 1987 to 1990 were included as participants in this study. The researchers assessed for eating disorder symptomatology like binge eating, compulsive exercise, and restrictive eating. To determine if participants met the criteria for Alcohol Use Disorder, they had to meet three or more symptoms of the research diagnostic criteria. The researchers had participants come in for an interview to confirm symptoms that met criteria of an eating disorder. The participants were asked about how often they consumed alcohol and how often they misused alcohol (Franko et al., 2005). When referring to how eating disorders and alcohol use disorder have an influence on one another, the researchers explained that several eating disorder symptoms predicted the onset of Alcohol Use Disorder. Even among individuals diagnosed with Anorexia Nervosa in this sample, there was a high rate of bulimic symptoms (80% of participants diagnosed with Anorexia Nervosa also exhibited bulimic symptoms during the course of the study), again confirming an association between these poor impulse-control behaviors (Franko et al., 2005).

The term multi-impulsive bulimic has been coined to describe people who are diagnosed with Bulimia Nervosa and who have at least three symptoms of poor impulse control (Fichter, Quadflieg, & Rief, 1994; Lacey, 1993). Some of these symptoms can

include binge eating, alcohol use, or suicide attempts. This term highlights the component of impulsivity in all of these problem behaviors. There has been research on how impulsivity contributes to the relationship between eating disorders and alcohol consumption. Ortego, Chapela, and Santoncini (2012) found that impulsivity was associated with disordered eating behaviors and binge drinking among high school females. While engaging in these impulsive eating behaviors, individuals lose control, just like they lose control while consuming alcohol. Lacey's study (1993) found that among participants diagnosed with Bulimia Nervosa, 22% consumed excessive alcohol weekly, 28% abused drugs, and 18% overdosed on drugs, revealing the tendency to lose control. This study discovered that 40% of the participants reported engaging in addictive behavior and self-damaging behavior, with 8% stating they cut themselves regularly (Lacey, 1993).

Self-control has been indicated as a predictor of eating disorder symptoms, based on 167 female undergraduate students (Xinaris & Boland, 1990). These participants filled out seven different measures, which assessed various constructs including severity of binge-eating, severity of dieting, attitudes that may be associated with eating disorders, body and self-image satisfaction, alcohol consumption, and the capability to use self-management or self-control strategies. The researchers found that self-control was the only significant predictor towards the measures of eating disorders, such that the more self-control an individual had, the less likely symptoms of eating disorders were present (Xinaris & Boland, 1990).

Further establishing an association between bingeing, purging, and impulsive alcohol use, 47 women with bulimia-spectrum disorders were given self-report measures

that assessed positive effects of thinness and dietary restriction, positive and negative consequences of eating, and the severity of behaviors and attitudes associated with individuals who have an eating disorder (Bruce, Mansour, & Steiger, 2009). The participants were also given measures to assess for Alcohol Use Disorder. To assess for impulsivity, participants were given a self-report measure (Bruce et al., 2009). The researchers discovered that depression and impulsivity were related to eating disordered symptoms and alcohol-related symptoms. They also found that women on the bulimic spectrum who had comorbid alcohol use disorder had endorsed items related to alcohol outcome expectancies, in which individuals expect alcohol to produce certain positive effects, while women on the bulimic spectrum without alcohol use disorder did not endorse those items (Bruce et al., 2009).

According to Mole et al. (2015), a specific type of impulsivity, motor impulsivity, which can be described as motor response inhibition or the failure to stop a dominant motor response prior to the onset of a target (Aron, Fletcher, Bullmore, Sahakian, & Robbins, 2003), is associated with problem eating behaviors such as those that lead to obesity. The researchers measured obesity and alcohol use among the participants. The participants then were given the UPPS-P Impulsive Behaviour Scale, a self-report measure, to assess impulsivity. The researchers also used the stop signal task to assess for motor response inhibition. The stop signal task is a task in which subjects viewed a computer screen and were instructed to suppress a response when they heard a beeping sound (Mole et al., 2015). Researchers found that obese subjects without Binge-eating Disorder and substance abusers were more impulsive (Mole et al., 2015). This result is somewhat at odds with the previous research establishing a link between Binge-eating

Disorder and impulsivity in alcohol consumption. In many of the aforementioned studies, the non-binge-eating disordered controls were of typical weight rather than obese.

Along with motor impulsivity, delay discounting, which is defined as an impulsive choice in which an individual chooses an immediate small reward rather than a delayed, larger reward, contributes to overeating as well (Manwaring, Green, Myerson, Strube, & Wilfley, 2011). In a study that demonstrated this relationship, 90 women were recruited to participate, with 30 of the women being obese (BMI > 29) and meeting the DSM-IV Binge-eating Disorder and 30 of the women being obese but not engaging in binge-eating behavior. The other 30 women did not engage in binge-eating behavior and had BMIs between 18 and 27. The participants were administered a computerized task to assess delay discounting along with two self-report measures to measure impulsivity, the Barratt Impulsiveness Scale-11 and the UPPS Impulsive Behaviour Scale. The researchers found that obese individuals who were diagnosed with Binge-eating Disorder discounted both delayed and probabilistic rewards more abruptly than the obese and control groups suggesting obese individuals with Binge-eating Disorder have higher impulsivity. Therefore, this coincides with the researchers finding that women who were diagnosed with Binge-eating Disorder were more likely to be impatient when a delayed reward was presented. They would rather choose an immediate reward over the larger delayed reward such as good health (Manwaring et al., 2011).

The primary aim of the present study was to determine if impulsivity influences the relationship between bingeing behavior and alcohol consumption and between purging behavior and alcohol consumption. In this study, it was predicted that impulsivity would mediate the relationship between bingeing behavior and alcohol consumption

among college women. It was also predicted that impulsivity would mediate the relationship between purging behavior and alcohol consumption among college women.

## Method

### Participants

Undergraduate female students ( $N = 62$ ) from all class levels were recruited from Murray State University with a mean age of 20.40 years ( $SD = 2.09$ ). The participants were recruited from both an online internet source and from their classrooms. Out of the 62 participants, 80% identified themselves as Caucasian, followed by African American (8%), Asian (5%), and other (6%). About thirty-six percent reported being a freshman in college, 18% reported as a sophomore, 18% reported as a junior, and 29% reported as a senior. Participants' self-reported mean weight was 163 lb ( $SD = 39.60$ ) and mean height was 65.29 in ( $SD = 2.3$ ). Participants' mean BMI was 26.86 ( $SD = 6.26$ ).

Twenty-seven participants (43%) reported having received therapy in the past for a problem or a disorder. Four participants (6%) reported a history of treatment for an impulsivity disorder and two participants (3%) reported a history of treatment for an eating disorder.

### Materials

*Demographics.* The demographics questionnaire included questions about age, gender, biological sex, ethnicity, and educational level. It also included questions addressing if participants have ever received therapy and have ever been treated for an eating disorder, substance use disorder, or impulsivity disorder (See Appendix A).

*Alcohol Use Disorders Identification Test (AUDIT;* Babor, Higgins-Biddle, Saunders, & Monterio, 2001). The AUDIT is a 10 question self-report measure which assesses for

alcohol use, excessive drinking, and consequences of drinking. It has been known to be precise when identifying alcohol dependence among college students (Babor et al., 2001). A test-retest reliability study coefficient of .86 was recorded in a sample that included cocaine abusers, alcoholics, and non-hazardous drinkers (Sinclair, McRee, & Babor, 1992). When the AUDIT was compared to other similar screening tests, there was a correlation of .88 with the Michigan Alcoholism Screening Test (Bohn, Babor, & Kranzler, 1995) and a correlation of .78 with the CAGE, which is an acronym for four questions involving alcohol use (Hays, Merz, & Nicholas, 1995). When identifying alcohol dependence among university students, the AUDIT has proven to be a precise measure (Fleming, Barry, & MacDonald, 1991). Participants who score between an 8 and 15 on the AUDIT are considered to have a moderate level of alcohol problems while participants who score a 16 or above are considered to have a high level of alcohol problems (Babor et al., 2001; see Appendix B).

*Eating Disorder Examination Questionnaire* (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q is a 33-item screener used to assess for eating disorders. It has four subscales including Eating Concern, Shape Concern, Weight Concern, and Dietary Restraint. The EDE-Q measures symptoms of disordered eating over a time line of 28 days. Although the EDE-Q has been used in previous research, no meaningful reliability and validity coefficients were reported in these studies. The sum of the item numbers 13 through 15 were used to measure symptoms of bingeing and the sum of item numbers 16 through 18 were used to measure symptoms of purging. The EDE-Q also asks participants for their height and weight to calculate their Body Mass Index (BMI); (Fairburn & Beglin, 1994; see Appendix C).

*Binge Eating Scale* (BES; Gormally, Black, Daston, & Rardin, 1982). The BES is a 16-item questionnaire used to measure the occurrence of binge eating behavior. Gormally and his colleagues (1982) developed the BES to determine the severity of binge eating among obese individuals. The researchers discovered that the BES was able to effectively differentiate among individuals in whether they had no, moderate, or severe binge eating problems (Gormally et al., 1982). Other researchers have used the BES to determine if it identifies Binge-eating Disorder in patients pursuing bariatric surgery (Grupski et al., 2013). These researchers found a Cronbach's alpha of .87, representing good internal consistency (Grupski et al., 2013). Timmerman (1999) reported a test-retest coefficient of .87 over two weeks. The sum of the items (ranging from 0 to 46) was calculated to determine the total scores in the present study (see Appendix D).

*Conners Continuous Performance Test 3<sup>rd</sup> Edition*. (Conners, 2014). The Conners Continuous Performance Test 3<sup>rd</sup> Edition (CPT-3) was used to measure the participants' impulsivity. The CPT-3 is a software version assessment in which individuals are instructed to respond by pressing a computer key to any letter on the computer screen besides the letter X. The CPT-3 includes 360 trials and takes about 14 minutes to complete. To test the reliability of the CPT-3, a sample of 120 respondents completed the CPT-3 twice, resulting in a test-retest correlation of .67. The validity of the impulsivity scales resulted in a Cohen's *d* of .10 on hit reaction time, .35 on commissions, and .38 on perseverations when comparing individuals diagnosed with ADHD and individuals from the general population. The scores that measure impulsivity were used in this study, and included: hit reaction time (the mean response speed of correct responses), commissions

(incorrect responses to non-targets), and perseverations (responses that are made in less than 100 milliseconds); (Conners, 2014).

### **Procedure**

Participant data were collected individually. Participants were given a copy of the consent form, and the researcher explained confidentiality and its limits along with the purpose of the study. They were given the EDE-Q to complete along with the AUDIT and BES. Participants were then asked to take the CPT-3. Once the participants finished the final assessment, they were debriefed.

## Results

First, we examined the relationship between all of the major variables in the current study. The table below displays the correlational, as well as descriptive information for the AUDIT, hit reaction time, commissions, perseverations, bingeing (EDE-Q), purging, and BES.

Table 1

*Correlations and Descriptive Information for Behavior Variables*

Variable	1	2	3	4	5	6	7	M(SD)
1. Audit		.11	.05	-.02	-.03	.07	.14	5.13(5.23)
2. HRT			-.64**	-.02	-.04	.07	.17	49.32(8.74)
3. COM				.30*	-.02	-.05	-.06	53.55(9.84)
4. PER					.12	.07	.19	50.45(6.39)
5. BINGE						.50**	.40**	10.42(22.77)
6. PURGE							.27*	2.97(5.41)
7. BES								12.50(7.73)

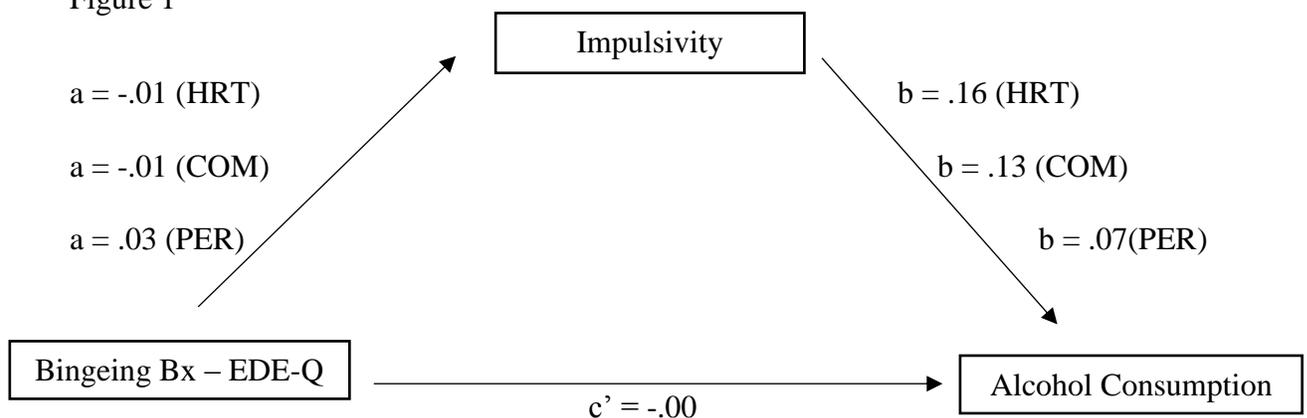
*Note.*  $N = 62$ . AUDIT is reported as the sum of items, ranging from 0 to 40, with higher scores indicating more problem drinking. Hit reaction time (HRT), commissions (COM), perseverations (PER) are reported as T-scores ( $M = 50$ ,  $SD = 10$ ). BINGE and PURGE are reported as frequency variables (# of days out of past 28 days). BES is reported as the sum of items, ranging from 0 to 46, with higher scores representing more binge-eating

symptoms.

\* $p < .05$ . \*\* $p < .01$ .

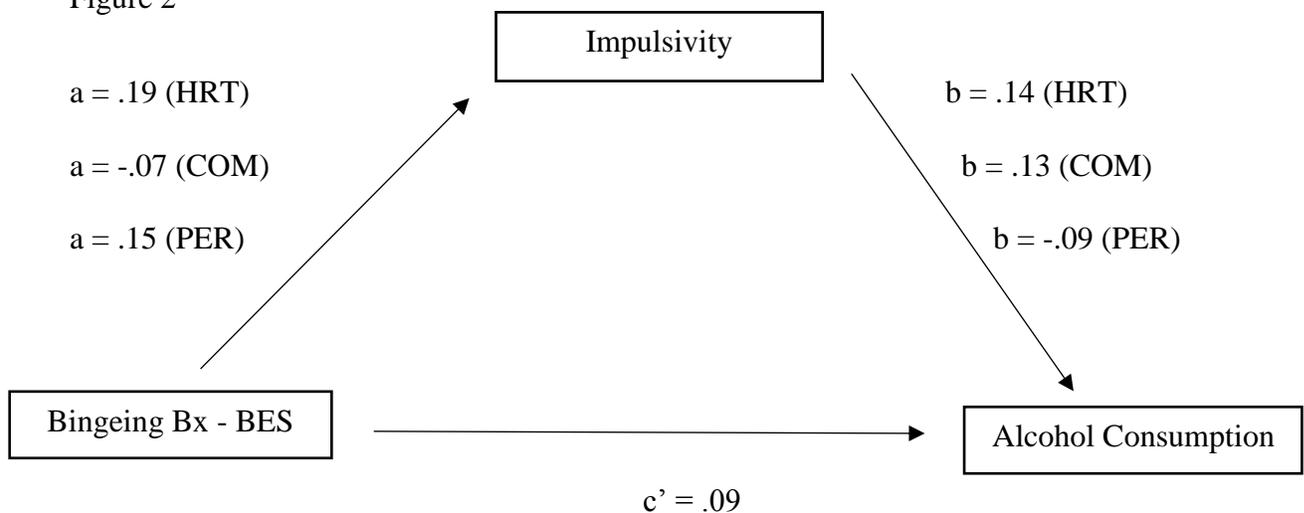
Then, a mediation analysis was used to test the hypothesis that impulsivity mediates the effect of bingeing behavior on alcohol consumption. Results indicated that bingeing behavior was not a significant predictor of hit reaction time,  $b = -.01$ ,  $SE = .05$ ,  $p = .776$ , 95% CI [-.11 to .08.] Bingeing behavior was not a significant predictor of commissions,  $b = -.01$ ,  $SE = .06$ ,  $p = .907$ , 95% CI [-.12 to .11] and was not a significant predictor of perseverations,  $b = .03$ ,  $SE = .04$ ,  $p = .375$ , 95% CI [-.04 to .10.] Hit reaction time was not a significant predictor of alcohol consumption,  $b = .16$ ,  $SE = .10$ ,  $p = .142$ , 95% CI [-.05 to .37.] Commissions was not a significant predictor of alcohol consumption as well,  $b = .13$ ,  $SE = .10$ ,  $p = .202$ , 95% CI [-.07 to .32.] Additionally, perseverations was not a significant predictor of alcohol consumption,  $b = -.07$ ,  $SE = .12$ ,  $p = .573$ , 95% CI [-.30 to .17.] The direct effect of bingeing behavior ( $b = -.00$ ,  $SE = .03$ ,  $p = .977$ , 95% CI [-.06 to .06]) was not a significant predictor of alcohol consumption after controlling for the mediator, impulsivity. The indirect effect, tested using a bootstrap estimation approach with 1000 samples (Preacher & Hayes, 2004), was not significant,  $b = -.01$ ,  $SE = .02$ , 95% CI [-.04 to .02]; (see Figure 1).

Figure 1



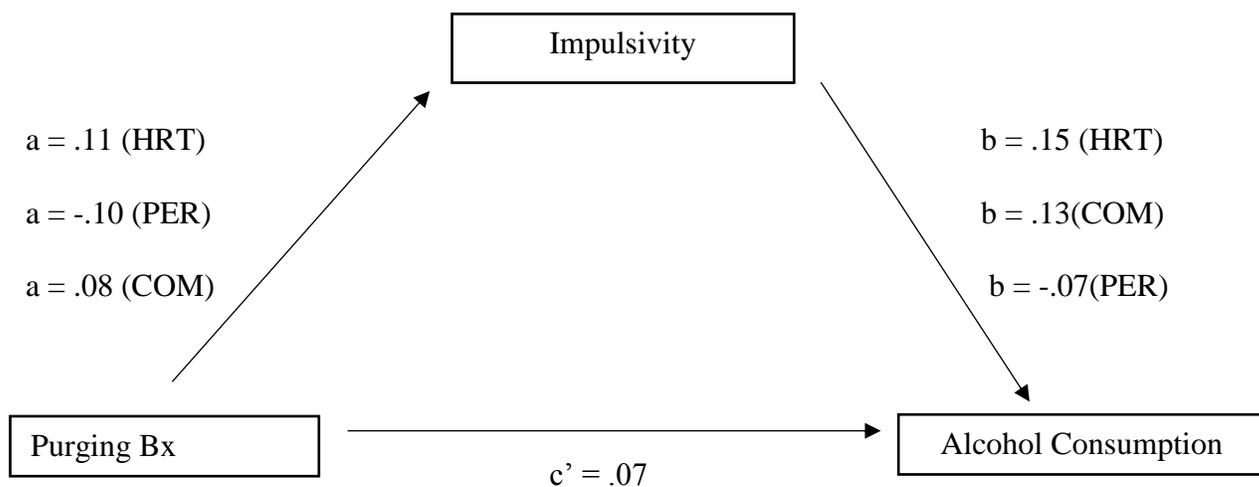
A second mediation analysis also tested whether impulsivity mediates the effect of bingeing behavior on alcohol consumption. Results indicated that bingeing behavior was not a significant predictor of hit reaction time,  $b = .19$ ,  $SE = .14$ ,  $p = .180$ , 95% CI [- .09 to .48.] Bingeing behavior was not a significant predictor of commissions,  $b = -.07$ ,  $SE = .16$ ,  $p = .660$ , 95% CI [-.40 to .26] as well as not a significant predictor of perseverations,  $b = .15$ ,  $SE = .10$ ,  $p = .153$ , 95% CI [-.06 to .36.] Hit reaction time was not a significant predictor of alcohol consumption,  $b = .14$ ,  $SE = .10$ ,  $p = .178$ , 95% CI [- .07 to .35.] Commissions was not a significant predictor of alcohol consumption as well,  $b = .13$ ,  $SE = .10$ ,  $p = .195$ , 95% CI [-.67 to .32.] Additionally, perseverations was not a significant predictor of alcohol consumption,  $b = -.09$ ,  $SE = .12$ ,  $p = .458$ , 95% CI [-.32 to .14.] The direct effect of bingeing behavior ( $b = .09$ ,  $SE = .09$ ,  $p = .329$ , 95% CI [-.09 to .27]) was not a significant predictor of alcohol consumption after controlling for the mediator, impulsivity. The bootstrap estimation indicated the indirect effect was not significant,  $b = .01$ ,  $SE = .03$ , 95% CI [-.05 to .08]; (see Figure 2).

Figure 2



A third mediation analysis tested whether impulsivity mediates the effect of purging behavior on alcohol consumption. Results indicated that purging behavior was not a significant predictor of hit reaction time,  $b = .11$ ,  $SE = .21$ ,  $p = .603$ , 95% CI [-.31 to .52.] Purging behavior was not a significant predictor of commissions,  $b = -.10$ ,  $SE = .23$ ,  $p = .685$ , 95% CI [-.56 to .37] as well as not a significant predictor of perseverations,  $b = .08$ ,  $SE = .15$ ,  $p = .596$ , 95% CI [-.22 to .38.] Hit reaction time was not a significant predictor of alcohol consumption,  $b = .15$ ,  $SE = .10$ ,  $p = .142$ , 95% CI [-.05 to .36.] Commissions was not a significant predictor of alcohol consumption as well,  $b = .13$ ,  $SE = .10$ ,  $p = .190$ , 95% CI -.07 to .32. Additionally, perseverations was not a significant predictor of alcohol consumption,  $b = -.07$ ,  $SE = .11$ ,  $p = .537$ , 95% CI [-.30 to .16.] The direct effect of purging behavior ( $b = .07$ ,  $SE = .13$ ,  $p = .590$ , 95% CI [-.18 to .32]) was not a significant predictor of alcohol consumption after controlling for the mediator, impulsivity. The bootstrap estimation indicated the indirect effect was not significant,  $b = -.00$ ,  $SE = .05$ , 95% CI [-.06 to .03]; (see Figure 3).

Figure 3



## Discussion

The present study looked at the relationship between bingeing behavior and alcohol consumption as well as the relationship between purging behavior and alcohol consumption among college women, to determine if impulsivity influences these relationships. It was expected that there would be significant correlations between the eating disorder behaviors and alcohol consumption due to past research findings. Researchers have previously found a significant relationship between severe levels of alcohol consumption and binge-eating behaviors among women (Piran & Robinson, 2006) and between purging behaviors and binge drinking (Anderson et al., 2005).

Unlike past research, the present study found no significant relationship between bingeing behavior and alcohol consumption nor between purging behavior and alcohol consumption. There are several possible explanations why the present study's results were non-significant. Although the sample size was small, it does not appear that low power was the problem as all of the correlations between the major study variables were small and did not approach significance. However, it is possible that sample characteristics played a role in the conflicting results.

Like the present study, some previous studies used college samples with women around the ages of 18 to 25. Some found relationships between these variables in non-clinical settings (Anderson et al., 2005; Luce et al., 2007; Piran & Robinson, 2006); whereas, others used clinical samples and found significant results (Franko et al., 2005). Across these previous studies, the participants' average BMI tended to be approximately

21 to 22, which is classified by the WHO (World Health Organization) as in the “normal weight” range. Participants in the present study had an average BMI of 26, which is in the “overweight” classification range (“normal weight” BMI is between 18.5 and 24.9). Because 21 to 22 is in the “normal weight” range, these conflicting results may be related to sample characteristics as those with lower weight may engage in different eating and dieting behaviors than those who are overweight.

Further, in all of the past research studies, the participants were categorized into groups of bingeing, purging, restricting, and/or control groups, suggesting that similar numbers of participants were engaging in eating disorder behaviors and non-eating disorder behaviors. In the present study, the participants were not grouped, but rather their problematic eating behaviors were measured on a continuum of behaviors. They were measured on a continuum because it was predicted that limited participants would endorse engaging in eating disorder behaviors, resulting in the inability to categorize into groups. Most participants did not endorse engaging in any bingeing and purging behaviors, resulting in a skewed distribution with most participants at the low end of the spectrum. Therefore, consistent with the hypothesis relating to differences in BMIs across studies, it appears that in previous studies, more participants engaged in eating disorder behaviors than the present study. Further, because the eating disorder variables’ values were not well distributed across the possible range of values, this results in a restricted range, reducing the magnitude of correlation coefficients.

With respect to measurement concerns, some of the self-report measures that were used in the present study were the same as the measures used in past studies. However, as noted in the materials section, the EDE-Q did not have any meaningful reliability and

validity coefficients that were reported in past studies, making its psychometric properties questionable. This could contribute to the results in the present study due to the possible inadequacy of the EDE-Q questions to measure bingeing and purging behavior.

Participants had some confusion with the frequency format within the EDE-Q. For example, item #15 asks on how many days episodes of overeating occur over a 28 day period. Some participants reported a number higher than 28, suggesting they did not understand the item. Because of concerns about this measure, the BES was added as a second way to assess eating disorder behaviors. The BES measured similar variables using a likert scale. In other words, items on the BES consisted of three to five statements for participants to choose from, with the statements being scored on a scale from 0 to 4. Participants also had confusion with some of these items. While completing the BES, several participants had questions on a specific item (item #7), which provided participants with four statements related to their behavior while dieting. Participants frequently asked which statement to choose if they never go on or have been on a diet, suggesting the measure may not have accurately captured the experience of the participants. Both of these measures yielded non-significant correlations between eating disorder behaviors and alcohol consumption.

It was also expected that impulsivity would mediate these relationships. In the present study, it was hypothesized that purging, bingeing, and drinking behaviors were acted on by impulse. The results indicated, however, that impulsivity did not correlate with these behaviors. Contradicting these results, past research indicated that impulsivity does contribute to the relationship between eating disorders and alcohol consumption (Ortego et al., 2012), while using self-report questionnaires as the impulsivity measure.

As indicated in the methods section, the present study used a computer task to assess for impulsivity rather than self-report questionnaires. The reliance on solely self-report questionnaires may positively bias the relationship between the variables due to common method variance. In other words, the measures are more positively correlated than the actual underlying constructs. Stated differently, the correlations reported in previous studies may be somewhat inflated due to shared method variance in the self-report questionnaires.

This study has several implications for future research, such as the need to include participants from a clinical sample rather than just from a non-clinical sample. Incorporating clients from an eating disorder treatment center may result in a broader range of scores because of a higher possibility of participants engaging in eating disorder behaviors. With a more varied sample, it would still be possible to measure the variables on a continuum but have a better overall distribution of variables. Assessing some of the major constructs with different measures may be beneficial in the future as well. Because the EDE-Q did not have meaningful reliability and validity coefficients, it would be useful to use a different measure of eating disorder behaviors, such as the Eating Attitudes Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). Using the EAT-26 may help minimize the confusion for participants as it gives them the option to endorse never engaging in behaviors (unlike the BES) and does not measure eating disorder behaviors as frequency variables (unlike the EDE-Q). The EAT-26 was not used in the present study because the questionnaire focuses greatly on anorexic behavior rather than bingeing and purging behaviors. However, if looking at a variety of problematic eating

disorder behaviors rather than just bingeing and purging, EAT-26 would be a reliable and valid measure to use.

In summary, there are still unanswered questions as to whether eating disorder behaviors and alcohol consumption are significantly related, due to the conflicting results between past studies and the present study. Regarding impulsivity, using behavioral measures in future studies may provide more ecologically valid results with the relationship between eating disorder behaviors and alcohol consumption. Although the current study's results were not statistically significant, it presented several unanswered, stimulating questions for future researchers, relating to the relationship between impulsivity and bingeing, purging, and alcohol consumption.

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## Appendix A

## Demographic Questionnaire

- 1) What is your age (in years)? \_\_\_\_\_
- 2) What is your gender? \_\_\_\_\_
- 3) What is your biological sex from birth?  
Male                  Female
- 4) Please indicate the race/ethnicity that best describes you. \_\_\_\_\_
- 5) Please indicate your year in school (according to academic standing):  
Freshman                  Junior                  Graduate  
Sophomore                  Senior                  Other
- 6) Have you ever received therapy previously for a problem or disorder?  
Yes                  No
- 7) Have you ever been treated for an eating disorder?  
Yes                  No
- 8) Have you ever been treated for a substance use disorder?  
Yes                  No
- 9) Have you ever been treated for an impulsivity disorder?  
Yes                  No

## Appendix B

## Alcohol Use Disorders Identification Test

**Instructions:** For each question below, please circle the choice that best describes your answer.

Questions	1	2	3	4	5
1) How often do you have a drink containing alcohol?	Never	Monthly or less	2 to 4 times a month	2 to 3 times a week	4 or more times a week
2) How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3) How often do you have 5 or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4) How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5) How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6) How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7) How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

8) How often during the last year have been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
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9) Have you or someone else been injured because of your drinking?

No                      Yes, but not in the last year                      Yes, during the last year

10) Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?

No                      Yes, but not in the last year                      Yes, during the last year

## Appendix C

## Eating Disorder Examination Questionnaire

**Instructions:** The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all of the questions. Please only choose one answer for each question. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days) only.

On how many of the past 28 days....	No days	1-5	6-12	13-15	16-22	23-27	Everyday
1 Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
2 Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?	0	1	2	3	4	5	6
3 Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
4 Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?	0	1	2	3	4	5	6
5 Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?	0	1	2	3	4	5	6
6 Have you had a definite desire to have a totally flat stomach?	0	1	2	3	4	5	6
7 Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
8 Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?	0	1	2	3	4	5	6
9 Have you had a definite fear of losing control over eating?	0	1	2	3	4	5	6
10 Have you had a definite fear that you might gain weight?	0	1	2	3	4	5	6

11 Have you felt fat?	0	1	2	3	4	5	6
12 Have you had a strong desire to lose weight?	0	1	2	3	4	5	6

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

Over the past four weeks (28 days).....

13 Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food) given the circumstances)? \_\_\_\_\_

14 ...On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)? \_\_\_\_\_

15 Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)? \_\_\_\_\_

16 Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight? \_\_\_\_\_

17 Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight? \_\_\_\_\_

18 Over the past 28 days, how many times have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape, or amount of fat or to burn off calories? \_\_\_\_\_

Do you do any of the following to help you lose weight?  
(Circle number)

	NEVER	OCCASION- ALLY	ONCE A WEEK	2-3 TIMES WEEK	DAILY	2-3 TIMES A DAY	5+TIMES A DAY
TAKE DIET PILLS	0	2	3	4	5	6	7
TAKE DIURETICS	0	2	3	4	5	6	7
TAKE LAXATIVES	0	2	3	4	5	6	7
MAKE YOURSELF VOMIT	0	2	3	4	5	6	7

Questions 19-21: Please circle the appropriate number. Please note that for these questions the term "binge eating" means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19 Over the past 28 days, on how many days have you eaten in secret (ie, furtively?.....Do not count episodes of binge eating?	No days	1-5	6-12	13-15	16-22	23-27	Every day
	0	1	2	3	4	5	6

---

20 On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?....Do not count episodes of binge eating	None of the times	A few of the times	less than half	Half of the times	More than half	Most of the time	Every time
	0	1	2	3	4	5	6

---

21 Over the past 28 days, how concerned have you been about other people seeing you eat?....Do not count episodes of binge eating	Not at all	Slightly	Moderately	Markedly			
	0	1	2	3	4	5	6

---

Questions 22-28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days).

---

On how many of the past 28 days.....	Not at all	Slightly	Moderately	Markedly			
22 Has your weight influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
23 Has your shape influenced how you think about (judge) yourself as a person?	0	1	2	3	4	5	6
24 How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	0	1	2	3	4	5	6
25 How dissatisfied have you been with your weight?	0	1	2	3	4	5	6
26 How dissatisfied have you been with your shape?	0	1	2	3	4	5	6
27 How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	0	1	2	3	4	5	6
28 How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	0	1	2	3	4	5	6

---

What is your weight at present? (Please give your best estimate). \_\_\_\_\_

What is your height? (Please give your best estimate). \_\_\_\_\_

If female: Over the past three-to-four months have you missed any menstrual periods? \_\_\_\_\_

If so, how many? \_\_\_\_\_

Have you been taking the “pill”? \_\_\_\_\_

Thank you

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## Appendix D

## Binge-Eating Scale

The BES is a 16-item questionnaire assessing the presence of certain binge eating behaviors which may be indicative of an eating disorder.

Below are groups of statements about behavior, thoughts, and emotional states. Please indicate which statement in each group **best describes how you feel**.

1.	<ul style="list-style-type: none"> <li><input type="radio"/> I do not think about my weight or size when I'm around other people.</li> <li><input type="radio"/> I worry about my appearance, but it does not make me unhappy.</li> <li><input type="radio"/> I think about my appearance or weight and I feel disappointed in myself.</li> <li><input type="radio"/> I frequently think about my weight and feel great shame and disgust.</li> </ul>
2.	<ul style="list-style-type: none"> <li><input type="radio"/> I have no difficulty eating slowly.</li> <li><input type="radio"/> I may eat quickly, but I never feel too full.</li> <li><input type="radio"/> Sometimes after I eat fast I feel too full.</li> <li><input type="radio"/> Usually I swallow my food almost without chewing, then feel as if I ate too much.</li> </ul>
3.	<ul style="list-style-type: none"> <li><input type="radio"/> I can control my impulses towards food.</li> <li><input type="radio"/> I think I have less control over food than the average person.</li> <li><input type="radio"/> I feel totally unable to control my impulses toward food.</li> <li><input type="radio"/> I feel totally unable to control my relationship with food and I try desperately to fight my impulses toward food.</li> </ul>
4.	<ul style="list-style-type: none"> <li><input type="radio"/> I do not have a habit of eating when I am bored.</li> <li><input type="radio"/> Sometimes I eat when I am bored, but I can often distract myself and not think about food.</li> <li><input type="radio"/> I often eat when I am bored, but I can sometimes distract myself and not think about food.</li> <li><input type="radio"/> I have a habit of eating when I am bored and nothing can stop me.</li> </ul>
5.	<ul style="list-style-type: none"> <li><input type="radio"/> Usually when I eat it is because I am hungry.</li> <li><input type="radio"/> Sometimes I eat on impulse without really being hungry.</li> </ul>

- I often eat to satisfy hunger even when I know I've already eaten enough. On these occasions I can't even enjoy what I eat.
- Although I have not physically hungry, I feel the need to put something in my mouth and I feel satisfied or only when I can fill my mouth (for example with a piece of bread).

6. After eating too much:

- I do not feel guilty or regretful at all.
- I sometimes feel guilty or regretful.
- I almost always feel a strong sense of guilt or regret.

7.

- When I'm on a diet, I never completely lose control of food, even in times when I eat too much.
- When I eat a forbidden food on a diet, I think I've failed and eat even more.
- When I'm on a diet and I eat too much, I think I've failed and eat even more.
- I am always either binge eating or fasting.

8.

- It is rare that I eat so much that I felt uncomfortably full.
- About once a month I eat so much that I felt uncomfortably full.
- There are regular periods during the month when I eat large amounts of food at meals or between meals.
- I eat so much that usually, after eating, I feel pretty bad and I have nausea.

9.

- The amount of calories that I consume is fairly constant over time.
- Sometimes after I eat too much, I try to consume few calories to make up for the previous meal.
- I have a habit of eating too much at night. Usually I'm not hungry in the morning and at night I eat too much.
- I have periods of about a week in which I imposed starvation diets, following periods of when I ate too much. My life is made of binges and fasts.

10.

- I can usually stop eating when I decide I've had enough.
- Sometimes I feel an urge to eat that I cannot control.
- I often feel impulses to eat so strong that I cannot win, but sometimes I can control myself.
- I feel totally unable to control my impulses to eat.

11.

- I have no problems stopping eating when I am full.

- I can usually stop eating when I feel full, but sometimes I eat so much it feels unpleasant.
- It is hard for me to stop eating once I start, I usually end up feeling too full.
- It is a real problem for me to stop eating and sometimes I vomit because I feel so full.

12.

- I eat the same around friends and family as I do when I am alone.
- Sometimes I do not eat what I want around others because I am aware of my problems with food.
- I often eat little around other people because I feel embarrassed.
- I'm so ashamed of overeating, I only eat at times when no one sees me. I eat in secret.

13.

- I eat three meals a day and occasionally a snack.
- I eat three meals a day and I usually snack as well.
- I eat many meals, or skip meals regularly.
- There are times when I seem to eat continuously without regular meals.

14.

- I don't think about impulses to eat very much.
- Sometimes my mind is occupied with thoughts of how to control the urge to eat.
- I often spend much time thinking about what I ate or how not to eat.
- My mind is busy most of the time with thoughts about eating.
- I seem to be constantly fighting not to eat.

15.

- I don't think about food any more than most people.
- I have strong desires for food, but only for short periods.
- There are some days when I think of nothing but food.
- Most of my days is filled with thoughts of food. I feel like I live to eat.

16.

- I usually know if I am hungry or not. I know what portion sizes are appropriate.
- Sometimes I do not know if I am physically hungry or not. In these moments, I can hardly understand how much food is appropriate.
- Even if I knew how many calories should I eat, I would not have a clear idea of what is, for me, a normal amount of food.

## Appendix E

**TO:** Laura Liljequist  
Department of Psychology

**FROM:** Institutional Review Board  
Sally Mateja, CIP, IRB Coordinator

**DATE:** March 30, 2016

**RE:** Human Subjects Protocol I.D. - IRB 16-135

On behalf of the IRB, I have completed my review of your student's Level 1 protocol entitled "The Relationship of Impulsivity to Eating Behaviors and Alcohol Consumption." After review and consideration, I have determined that the research, as describe in the protocol form, will be conducted in compliance with Murray State University guidelines for the protection of human participants.

**The cover letter and materials that are to be used in this research study are attached to the email containing this letter. These are the forms and materials that must be presented to the subjects. Use of any process or forms other than those approved by the IRB will be considered misconduct in research as stated in the MSU IRB Procedures and Guidelines section 20.3. If this research study is being conducted by a student, you, as the faculty mentor, are responsible for ensuring that the correct processes and forms are used by your student.**

This Level 1 approval is valid until March 29, 2017. If data collection and analysis extends beyond this time period, the research project must be reviewed as a continuation project by the IRB prior to the end of the approval period, March 29, 2017. You must reapply for IRB approval by submitting a Project Update and Closure form (available on the Institutional Review Board web site). You must allow ample time for IRB processing and decision prior to your expiration date, or your research must stop until such time that IRB approval is received. If the research project is completed by the end of the approval period, then a Project Update and Closure form must be submitted for IRB review so that your protocol may be closed. **It is your responsibility to submit the appropriate paperwork in a timely manner.**

The protocol is approved. You may begin data collection now.

