

Binge Eating Behaviors and Motoric, Attentional, and Nonplanning Impulsivity

Keiko Y. Miller and Beth Limberg
Alliant International University

This study investigated the relationship between three distinct types of impulsivity (motoric, attentional, and nonplanning) and binge eating behaviors in 76 adult women. The participants completed a binge eating measure (Eating Disorder Diagnostic Scale) and an impulsivity measure (Barratt Impulsivity Scale). A significant difference was found between the impulsive behaviors of binge eaters and non-binge eaters, but binge eating alone was not significantly related to type of impulsivity. Post-hoc analysis demonstrated that binge eaters had significantly higher levels of attentional and nonplanning impulsivity than non-binge eaters. When we used participants' scores from the extreme ends of the distribution, comparing binge eaters with non-binge eaters reporting no symptoms, the analysis demonstrated significantly higher levels of motoric impulsivity in addition to attentional and nonplanning impulsivity among binge eaters. The implications of these results are discussed, as are areas for future research.

Many individuals binge eat at some point in their lives but will never develop disordered eating problems that interrupt their daily functioning. The difference between the normal incidence of binge eating and a Binge Eating Disorder (BED) is based on food consumption patterns (i.e., intake frequency, duration of binge eating, and amount of food consumed at a time) (Keel, 2005; Fairburn, 1995). Women are 1.5 times more likely to be diagnosed with BED than men (Keel, 2005). Several researchers claim that binge eating results from restricting food intake and is used as a way to avoid feeling intense emotions (Polivy & Herman, 1985; Heatherton & Baumeister, 1991). Others have correlated binge eating with impulsivity, which is also associated with obesity among women (Davis, Levitan, Smith, Tweed, & Curtis, 2006; Nederkoorn, Braet, Van Eijs, Tanghe, & Jansen, 2005), substance abuse (Kane, Loxton, Staiger, & Dawe, 2004), spontaneity and sensation seeking (Wonderlich, Connolly, & Stice, 2004), and dietary overcontrol and dietary restraint (Steiger, Lehoux, & Gauvin, 1999). Impulsivity is commonly associated with an inability to inhibit specific actions, irresponsibility, and a failure to consider the consequences of one's actions (Logan, Schachar, & Tannock, 1997; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001; Patton, Stanford, & Barratt, 1995). Studies examining comorbidity between Attention Deficit Hyperactivity Disorder (ADHD) and overeating have found connections between ADHD and childhood obesity (Agranat-Meged et al. 2005; Rojo, Ruiz, Dominguez, Calaf, &

Livianos, 2006) and eating disorders (Biederman et al., 2007; Altfas, 2002).

Three aspects of ADHD (hyperactivity, inattention, and poor executive functioning) are similar to three aspects in Barratt's impulsivity model (motoric, attentional, and nonplanning impulsivity; Barratt, 1993). Barratt's impulsivity model considers biological, cognitive, environmental, and behavioral factors impacting an individual (Patton et al., 1995). Motoric impulsivity, engaging in a behavior with no prior thinking/reasoning, has been associated with difficulty in maintaining treatment gains following successful obesity treatment (Nederkoorn, Jansen, Mulkens, & Jansen, 2006). Attentional impulsivity, making quick decisions without paying attention to stimuli, has been shown to result in less positive parenting and parental involvement (Zinchuk, Noe, & Gerdes, 2007). Finally, nonplanning impulsivity, orienting oneself in the present with no regard for future consequences or events, has been shown to affect one's sensitivity to positive rewards, such as praise and money (De Wit, Flory, Acheson, McCloskey, & Manuck, 2007). When examining the association between binge eating and motoric, attentional, and nonplanning impulsivity, binge eaters have been shown to have higher levels of all three types of impulsivity during meals (following an 8-hour fast) and during cortisol suppression (after receiving dexamethasone, which reduces stress levels), but lower levels of nonplanning impulsivity on several behavioral measures of response planning compared to non-binge eaters (Galanti, Gluck, & Geliebter, 2007; Diaz-Marsá et al., 2008; Rosval et al., 2006).

Given the current literature that suggests an association between binge eating behaviors and impulsivity (Lledo & Waller, 2001; Rosval et al., 2006; Díaz-Marsá et al., 2008; Galanti et al., 2007), this study analyzes the relationship between three specific types of impulsivity (i.e., motoric, attentional and nonplanning) and how it affects eating behaviors using a sample of binge eaters and non-binge eaters. This study attempts to clarify any misinterpretations

This study was supported by California School of Professional Psychology-Alliant International University. The authors would like to thank Remuda Ranch Treatment Center, Summit Eating Disorders, Sean McFarland, and Ellyn Herb for their assistance in data collection.

Correspondence concerning this article should be addressed to Keiko Y. Miller, California School of Professional Psychology, Alliant International University, 2030 W. El Camino Avenue, Ste. 200, Sacramento, CA 95833. Email: impulsivityresearch@gmail.com.

about how impulsivity affects eating behaviors and highlights the importance of how the term “impulsivity” is defined in the current literature. Based on the research reviewed above, we hypothesized that binge eaters would have higher levels of attentional and motoric impulsivity and lower levels of nonplanning impulsivity compared to non-binge eaters.

Method

Measures

Barratt Impulsiveness Scale-version 11 (BIS-11). The BIS-11 measures motoric, attentional, and nonplanning impulsivity (Barratt, 1993). The participants were asked to respond to items examining how frequently they engage in impulsive behaviors on a four-point Likert scale ranging from 1 (*rarely/never*) to 4 (*almost always*). The measure produces a score for each type of impulsivity as well as a total impulsivity score. The coefficient alphas (internal reliability) from previous research were .72 with substance abusers, .82 with undergraduate students, and .83 with psychiatric patients (Rosval et al., 2006).

Eating Disorder Diagnostic Scale (EDDS). The EDDS is a diagnostic measure that is intended to diagnose Anorexia Nervosa (AN), Bulimia Nervosa (BN) and BED using the DSM-IV-TR criteria (Stice, Telch, & Rizvi, 2000). However, a binge eating subscale, which is based on the EDDS, was organized by the first author for the purpose of examining binge eating behaviors among those who endorse a range of symptoms, including those who endorse none. The binge eating subscale is comprised of the ten BED diagnostic items (based on the DSM-IV-TR) listed in the original EDDS measure for the purpose of determining presence of binge eating behaviors. At the time this study was conducted, no such scale had been published. On both the original EDDS and the binge eating subscale, symptoms are rated by participants using a Likert-type scale ranging from yes/no responses to numbered responses (Stice, Telch, & Rizvi, 2000). There is good internal consistency indicated by a Cronbach’s alpha of .89 for the original EDDS measure (Stice, Fisher, & Martinez, 2004). The binge eating subscale is comprised of eight yes/no and two Likert scale answer choices. One point per item was counted for participants endorsing *yes* on any of the eight yes/no items and for circling any number besides zero on each of the two Likert scale items. The overall maximum score was 10. The coefficient alpha (internal reliability) for the subscale was .94, but the external validity for the subscale has not been determined since the subscale has not yet been validated.

It may have been more useful and more powerful to use a scale that assesses only binge eating behaviors, however the one binge eating scale published (Binge Eating Scale) only assesses the severity of binge eating in obese binge eaters (Gormally, Black, Daston, & Rardin, 2002). Therefore, it was not feasible to use the Binge Eating Scale in this study because the sample population was not intended to exclude non-obese individuals.

Participants

A total of 76 adult women participated in this study. They were divided into a binge eating group and a non-binge eating group in order to examine the associations and differences between the two groups. A median split was conducted because the population sample was non-normal and it provided a way to equally divide the number of participants into each group. The binge-eating group comprised of participants who endorsed a total of 9+ points on the binge eating subscale, and the non-binge eating group comprised of those that endorsed 0 to 8.89 points on the binge eating subscale. The binge-eating group comprised of 40 women and the non-binge eating group comprised of 36 women. Since a large number of non-binge eating participants fell on the extreme ends of the distribution, an additional median split was conducted. After the median split, the non-binge eating group (n=10) comprised of participants that endorsed 0 points on the subscale, and the binge eating group (n=40) comprised of participants that endorsed a total of 9+ points on the subscale. The sample size remained unchanged for the binge eating group after the median split. All of the participants ranged in age from 17 to 56 years old ($M = 28.85$ years). Their ethnicity composition was 66% European American, 16% Asian American, 8% Hispanic American, 7% African American, and 3% Pacific Islander. The participants income ranged from \$0-\$100,000+ ($M = \$14,294$).

The participants were originally recruited from eating disorder treatment centers, private therapists, and a community college class via mail. Each participant received a sealed research packet consisting of a letter of introduction, informed consent form, BIS-11 and EDDS questionnaires. A second attempt was made to increase the sample size of this study by recruiting participants online through the National Eating Disorder Association (NEDA) and through a survey website called PsychData. Initially, we mailed 50 packets over a 4-month period and 30 participants returned the packets. The response rate jumped to a total of 86 research packets after using PsychData for three weeks. It was the first author’s original intention to use the whole population sample to correlate the binge eating subscale with the EDDS; however, this could not be done because there was an unforeseen PsychData website restriction in transferring a hardcopy of the EDDS to a softcopy on PsychData; therefore, the online data could not be utilized for examining the validity of the binge eating subscale.

Procedure

All participants were treated ethically and in accordance with the American Psychological Association’s guidelines regarding treatment of human subjects, obtaining consent from participants, conducting data collection, and handling confidential materials. This study was submitted to the Institutional Review Board of a major university in California and was approved. Participants who were recruited through the eating disorder treatment centers gave prior consent to participate in the study and were given the

BINGE EATING BEHAVIORS AND IMPULSIVITY

sealed research packets individually by a proctor at the research site. Participants who were recruited through a community college class gave prior consent and the classroom professor administered the sealed packets to consenting students. All participants were offered an opportunity to enroll in a raffle to win either a \$10 Starbucks or Amazon.com gift card as an incentive for their participation.

Results

Binge Eating Subscale and EDDS

The correlation between the EDDS scale and the binge eating subscale was calculated to test whether the binge eating subscale could be externally validated in the future. A significant positive correlation was found between the EDDS scale and the binge eating subscale: participants who had higher scores on the binge eating subscale also had higher scores on the EDDS ($r = .36, p < .01$). However, the strength of that relationship was relatively weak ($r^2 = .13$), suggesting that, while the binge eating subscale and the EDDS are statistically related, they are measuring different constructs. Participants who had higher scores on the binge eating subscale also had higher scores on the attentional, motoric, and nonplanning subscales of the BIS-11, and higher combined scores across all three subscales. Participants who had higher attentional impulsivity had higher motoric and nonplanning impulsivity. In addition, participants who had higher motoric impulsivity also had higher nonplanning impulsivity. A zero-order correlation matrix of the EDDS, BIS-11, binge eating subscale, and attentional, motoric, and nonplanning subscales is presented in Table 1. The means and standard deviations of the whole sample and extreme sample by type of impulsivity and group are presented in Table 2.

Binge Eating and Type of Impulsivity

First, we conducted two-sample *t*-tests to examine differences in the mean score of impulsivity between the binge- and the non-binge eating groups. Results indicated that the binge eating group demonstrated significantly higher levels of total impulsivity on the BIS-11 ($t(74) = -2.61, p < .05$). In addition, the binge-eating group reported

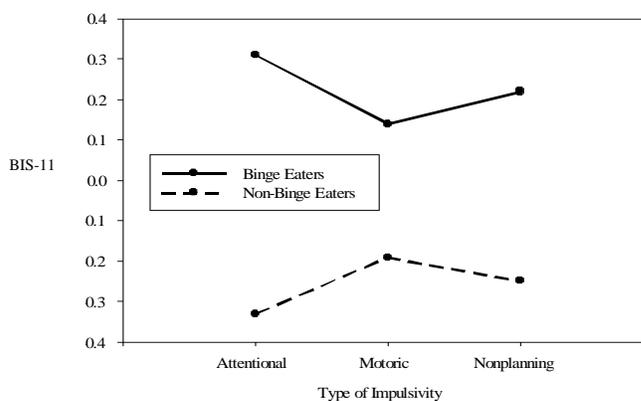


Figure 1. Mean Z-Score for Binge Eating Scale by Type of Impulsivity and Presence of Binge Eating – Whole Sample

significantly higher levels of attentional ($t(74) = -2.86, p < .05$) and nonplanning ($t(74) = -2.06, p < .05$) impulsivity than the non-binge eating group. There was no significant difference in motoric impulsivity between the binge eating and non-binge eating group ($t(74) = -1.43, p > .05$). The differences in means are presented in Figure 1.

Similarly, we conducted two-sample *t*-tests to examine differences in the mean score of impulsivity between the binge-eating and asymptomatic groups. The binge eating group included those that reported more than 9 binge eating symptoms (as in the previous analysis), whereas the asymptomatic group included those that reported having no binge eating symptoms. The binge eating group was found to have significantly higher levels of total impulsivity on the BIS-11 than the asymptomatic binge eating group ($t(48) = -4.06, p < .05$). Moreover, the binge eating group had significantly higher levels of motoric ($t(48) = -3.75, p < .05$), attentional ($t(48) = -3.83, p < .05$), and nonplanning ($t(48) = -2.58, p < .05$) impulsivity than the non binge-eating group. Notably, in contrast to analyses using the whole sample, when comparing binge eaters with asymptomatic non-binge eaters, binge eaters had significantly higher levels of motoric impulsivity in addition to attentional and nonplanning impulsivity. The differences in means are presented in Figure 2.

Table 1

Correlation Matrix of EDDS, BIS-11, Binge Eating Subscale, Attentional, Motoric, and Nonplanning Impulsivity

	EDDS	BIS-11	Binge Eating Subscale	Attentional	Motoric	Nonplanning
EDDS	---					
BIS-11	.22	---				
Binge Eating Subscale	.36**	.42*	---			
Attentional	.05	.71**	.40*	---		
Motoric	.17	.78**	.30*	.34*	---	
Nonplanning	.27	.84**	.30*	.41*	.50*	---

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

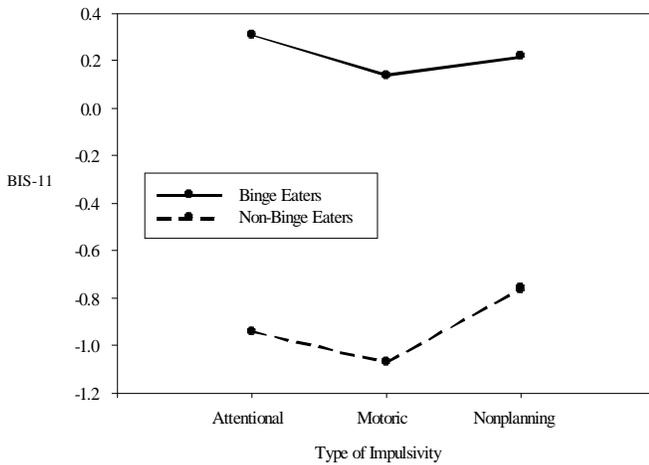


Figure 2. Mean Z-Score for Binge Eating Scale by Type of Impulsivity and Presence of Binge Eating – Extreme Sample

Discussion

We hypothesized that binge eaters would have higher levels of motoric and attentional impulsivity and lower levels of nonplanning impulsivity compared to non-binge eaters. The binge-eating group was found to have significantly higher impulsivity scores compared to both the non-binge eating and the asymptomatic groups (whole and extreme samples analysis). More specifically, binge eaters had significantly higher levels of attentional and nonplanning impulsivity than non-binge eaters. Additionally, binge eaters had significantly higher levels of motoric impulsivity only when compared with asymptomatic non-binge eaters. These results must be interpreted with caution because the binge eating subscale has not yet been validated by other studies.

Attentional impulsivity was linked to binge eating behaviors. Our results suggest that this type of impulsivity is

higher in binge eaters compared to non-binge eaters, regardless of how our population sample is split. Rosval and colleagues (2006) also found that attentional impulsivity was higher in the eating disordered groups compared to a non-clinical control group, although the way in which attentional impulsivity and disordered eating are related is unclear. This study highlights the importance of how binge eaters may be driven by impulsive actions, especially inattention. One possible explanation is that binge eaters may be attentive to internal or external processes (e.g., cravings to binge, environmental stressors) instead of being attentive to the behavior and process of eating. Non-binge eaters typically are cognizant of what they are eating, how it tastes, how fast they are eating, whereas binge eaters are not aware of how fast they are eating or whether they are full. Interventions should aim to help binge eaters be mindful and attentive to the behavior and sensations of eating.

The current study found that nonplanning impulsivity was also higher in binge eaters, regardless of which sample was compared. This finding is consistent with other studies that have used the BIS-11 to study motoric, attentional and nonplanning impulsivity (Díaz-Marsá et al., 2008; Rosval et al., 2006; Galanti et al., 2007). The identification of nonplanning impulsivity as characteristic of binge eating has implications for treatment. It may be that non-binge eaters are aware of their dietary plans during the course of the day (planned meal times, thoughts on what will be eaten at meals) or as they become hungry, while binge eaters may react without planning. Treatment interventions could target creating a structure around eating (e.g., regulated times to eat, duration of eating, frequency of eating, amount of food). However, Rosval and colleagues (2006) found that nonplanning impulsivity was not elevated in those diagnosed with BN, and that nonplanning impulsivity was deflated in those diagnosed with both AN, Restricting Type and AN, Binge-Eating/Purging Type. Additionally, several

Table 2

Means of z-scores and standard deviations of whole sample and extreme sample by type of impulsivity and group

Type of Impulsivity	Whole Sample					
	Presence of Binge Eating					
	Binge Eaters			Non-Binge Eaters		
	<i>N</i>	<i>M (z-score)</i>	<i>SD</i>	<i>N</i>	<i>M (z-score)</i>	<i>SD</i>
Attentional	40	.31	.91	36	-.33*	1.01
Motoric	40	.14	.96	36	-.19	1.02
Nonplanning	40	.22	1.02	36	-.25*	.95

Type of Impulsivity	Extreme Sample					
	Presence of Binge Eating					
	Binge Eaters			Non-Binge Eaters		
	<i>N</i>	<i>M (z-score)</i>	<i>SD</i>	<i>N</i>	<i>M (z-score)</i>	<i>SD</i>
Attentional	40	.31	.91	10	-.94*	.95
Motoric	40	.14	.96	10	-1.07*	.69
Nonplanning	40	.22	1.02	10	-.76*	1.30

Note. **p* < .05 between the binge eating and non-binge eating groups.

BINGE EATING BEHAVIORS AND IMPULSIVITY

community studies have found lower levels or no correlation between nonplanning impulsivity and binge eaters (Rosval et al., 2006; Lyke & Spinella, 2004). These contradictory results suggest that the relationship between binge-eating and nonplanning impulsivity is not fully understood, and warrants further investigation.

The relationship between binge eating and motoric impulsivity differed depending on which sample was compared. In the whole sample analysis, binge-eaters did not show higher rates of motoric impulsivity than non-binge eaters. However, when compared to asymptomatic non-binge eaters (those who reported no symptoms), binge eaters (those reporting more than 9 symptoms) did have significantly higher rates of motoric impulsivity (extreme sample analysis). A previous study found that individuals diagnosed with BN and AN, Binge-Eating/Purging Type had higher levels of motoric impulsivity compared to the control group and compared to individuals diagnosed with AN, Restricting Type (Rosval et al., 2006).

Our finding that the symptomatic non-binge eating group is more similar to the binge eating group in terms of motoric impulsivity, compared to the asymptomatic group suggests that motoric impulsivity may present as a risk factor in the development of BED. Future research comparing the three groups (no binge eating symptoms, some binge eating symptoms, and BED) may enable further understanding of the relationship between motoric impulsivity and levels of disordered binge eating behavior. In addition, future research might examine the time it takes for a binge eater to start bingeing after the thought enters the person's mind or the duration of binge episodes. These findings may also have clinical implications. High motoric impulsivity may enable a person to binge without thinking about what is causing or motivating her to binge eat. If this is the case, then it would be important to address the time it takes for a binge eater to start bingeing after the urge enters the person's mind. Additionally, treatment could help a binge eater develop cognitive interventions, such as writing down thoughts and motivations associated with binge eating, to thereby enable mindfulness and decrease motoric impulsivity and the urge to binge.

Limitations

Although the findings in this study are of importance, there are several limitations to be considered. For example, the number of participants in this study may be too small to accurately evaluate the relationship between motoric, attentional, and nonplanning impulsivity in binge eaters and non-binge eaters. The use of a new measure without established clinical cut-offs to identify the binge eating group is also a limitation of this study. Another limitation is the exclusion of men from this study. Although, data from men may have yielded important information about their binge eating behaviors (e.g., prevalence, frequency, duration, presence of impulsivity), it would have been difficult to obtain a strong sample size with an equal number of

experimental and control participants because of the low number of self-reported male binge eaters (Costin, 2007).

The lack of ethnic diversity in this sample is also a limitation, as few people from minority backgrounds are represented. Due to the high number of European Americans in this study, it is difficult to generalize to other ethnicities. However, existing literature suggests that European American women are more likely to be referred for eating disorders than other ethnicities (Cachelin & Striegel-Moore, 2006). This may simply indicate that women of non-European descent present less frequently for treatment than European American women.

Another limitation is associated with data collection. One of the initial difficulties with data collection was the low response rate from mailed research packets. Initially, we mailed 50 packets over a 4-month period and only 30 participants returned the packets. The response rate jumped to a total of 86 research packets after using PsychData for three weeks.

Finally, the use of self-report measures (one of which is not yet validated) adds limitation to this study. Furthermore, since the research-revised subscale of the EDDS and the BIS-11 are self-report questionnaires, the objectivity of the participants' responses may be limited.

Implications for Future Research

Given the limitations of this study and the importance of this topic, further research on binge eating and attentional, motoric, and nonplanning impulsivity should be conducted. Replicating this study using a larger sample size may provide a clearer association between impulsivity (i.e., motoric, attentional, and nonplanning) and binge eating behaviors, which could illuminate additional factors that contribute to the relationship between impulsivity and binge eating. Additionally, although it is apparent that motoric, attentional, and nonplanning impulsivity are correlated with binge eating behaviors, it remains unclear how they are related to one another. Adding a binge eating subscale to the EDDS, such as the one developed for this study, may prove helpful in assessing those who do not meet the full diagnosis of BED, but who display features of BED. Also, adding a binge eating subscale to the EDDS, such as the one developed for this study, would likely prove helpful in assessing those who do not meet the full diagnosis of BED, but who display features of BED. Establishing a validated binge eating scale would give future researchers and treating professionals an accurate and effective way to separate out those who binge eat and those who do not. Not having a validated binge eating scale has created a limitation and the results of this study may have been different if one existed.

Additionally, future studies with large samples should clarify the relationship(s) between motoric, attentional, and nonplanning impulsivity and binge eating. It is important that impulsivity is measured as a multidimensional construct in future research, as evidenced by previous research and our results. The current study suggests that multiple constructs and variables may impact the relationship between

impulsivity and eating behaviors. It is important for future research to identify the underlying variables that impact this relationship, such as, how impulsivity is defined, how eating behaviors are categorized, and the demographic variables (i.e., age, gender, presence of disordered eating). At present, there is limited literature that examines the relationship between impulsivity and binge eating. Further research in this area would benefit patients with disordered eating and impulse problems. For example, it would inform treatment protocols to know if there is a directional relationship between binge eating and impulsivity (that is, if impulsivity makes one vulnerable to binge eating or if binge eating is simply comorbid with impulsivity). A more complete understanding of the complex association between binge eating and impulsivity would have a major impact on the field of eating disorders and impulsivity. For example, treatment considerations and techniques for BED could be expanded to reflect the interplay between binge eating and impulsivity. Research efforts may also be able to pinpoint a common variable between binge eating and impulsivity that could further the education and training of the treating professionals in the field of eating disorders.

References

- Agranat-Meged, A. N., Deitcher, C., Goldzweig, G., Leibenson, L., Stein, M., & Galili-Weisstub, E. (2005). Childhood obesity and attention deficit/hyperactivity disorder: A newly described comorbidity in obese hospitalized children [Electronic version]. *International Journal of Eating Disorders*, *37*(4), 357-9. doi:10.1002/eat.20096
- Altfas, J. R. (2002). Prevalence of attention deficit/hyperactivity disorder among adults in obesity treatment [Electronic version]. *BMC Psychiatry*, *2*, 9. doi:10.1186/1471-244X-2-9
- Barratt, E. S. (1993). Impulsivity: Integrating cognitive, behavioral, biological, and environmental data. In W. McCown, J. Johnson, & M. Shure (Eds.), *The impulsive client: Theory, research, and treatment* (pp. 39-56). Washington, DC: American Psychological Association. doi:10.1037/10500-003
- Biederman, J., Ball, S. W., Monuteaux, M. C., Surman, C. B., Johnson, J. L., & Zeitlin, S. (2007). Are girls with ADHD at risk for eating disorders? Results from a controlled, five-year prospective study [Electronic version]. *Journal of Developmental and Behavioral Pediatrics*, *28*(4), 302-307. doi:10.1097/DBP.0b013e3180327917
- Cachelin, F., Striegel-Moore, R.H. (2006). Help seeking and barriers to treatment in a community sample of Mexican American and European American women with eating disorders [Electronic version]. *International Journal of Eating Disorders*, *39*, 154-161. doi:10.1002/eat.20213
- Costin, C. (2007). Young, white, and female: Myth or reality? *The eating disorder sourcebook* (3rd ed., p. 40). New York: McGraw-Hill.
- Davis, C., Levitan, R. D., Smith, M., Tweed, S., & Curtis, C. (2006). Associations among overeating, overweight and attention deficit/hyperactivity disorder: A structural equation modeling approach [Electronic version]. *Eating Behaviors*, *7*(3), 266-274. doi:10.1016/j.eatbeh.2005.09.006
- De Wit, H., Flory, J. D., Acheson, A., McCloskey, M., & Manuck, S. B. (2007). IQ and nonplanning impulsivity are independently associated with delay discounting in middle-aged adults [Electronic version]. *Personality and Individual Differences*, *42*(1), 111-121. doi:10.1016/j.paid.2006.06.026
- Díaz-Marsá, M., Carrasco, J. L., Basurte, E., Sáiz, J., López-Ibor, J. J., & Hollander, E. (2008). Enhanced cortisol suppression in eating disorders with impulsive personality features [Electronic version]. *Psychiatry Research*, *158*(1), 93-97. doi:10.1016/j.psychres.2007.06.020
- Fairburn, C. (1995). *Overcoming binge eating*. New York: Guilford.
- Galanti, K., Gluck, M. E., & Geliebter, A. (2007). Test meal intake in obese binge eaters in relation to impulsivity and compulsivity [Electronic version]. *International Journal of Eating Disorders*, *40*(8), 727-732. doi:10.1002/eat.20441
- Gormally, J., Black, S., Daston, S., & Rardin, D. (2002). The assessment of binge eating severity among obese persons [Electronic version]. *Addictive Behaviors*, *7*(1), 47-55. doi:10.1016/0306-4603(82)90024-7
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness [Electronic version]. *Psychological Bulletin*, *110*(1), 86-108. doi:10.1037/0033-2909.110.1.86
- International Society for Research on Impulsivity. (2006). *BIS-11 Translations* [Data file]. Available from International Society for Research on Impulsivity Web site, <http://impulsivity.org>
- Kane, T. A., Loxton, N. J., Staiger, P. K., & Dawe, S. (2004). Does the tendency to act impulsively underlie binge eating and alcohol use problems? An empirical investigation [Electronic version]. *Personality and Individual Differences*, *36*(1), 83-94. doi:10.1016/S0191-8869(03)00070-9
- Keel, P. K. (2005). *Eating disorders*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Lledo, E. P., & Waller, G. (2001). Bulimic psychopathology and impulsive behaviors among nonclinical women [Electronic version]. *International Journal of Eating Disorders*, *29*(1), 71-75. doi:10.1002/1098-108X(200101)29:1<71::AID-EAT11>3.0.CO;2-W
- Logan, G. D., Schachar, R. J., & Tannock, R. (1997). Impulsivity and inhibitory control [Electronic version]. *Psychological Science*, *8*, 60-64. doi:10.1111/j.1467-9280.1997.tb00545.x
- Lyke, J. A., & Spinella, M. (2004). Associations among aspects of impulsivity and eating factors in a nonclinical

BINGE EATING BEHAVIORS AND IMPULSIVITY

- sample [Electronic version]. *International Journal of Eating Disorders*, 36(2), 229-233. doi:10.1002/eat.20025
- Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity [Electronic version]. *American Journal of Psychiatry*, 158, 1783-1793. doi:10.1176/appi.ajp.158.11.1783
- Nederkoorn, C., Braet, C., Van Eijs, Y., Tanghe, A., & Jansen, A. (2005). Why obese children cannot resist food: The role of impulsivity [Electronic version]. *Eating Behaviors*, 7(4), 315-322. doi:10.1016/j.eatbeh.2005.11.005
- Nederkoorn, C., Jansen, E., Mulkens, S., & Jansen, A. (2006). Impulsivity predicts treatment outcome in obese children [Electronic version]. *Behaviour Research and Therapy*, 45(5), 1071-1075. doi:10.1016/j.brat.2006.05.009
- Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale [Electronic version]. *Journal of Clinical Psychology*, 51(6), 768-774. doi:10.1002/1097-4679(199511)51:6<768::AID-JCLP2270510607>3.0.CO;2-1
- Polivy, J., & Herman, C. P. (1985). Dieting and bingeing: A causal analysis [Electronic version]. *American Psychologist*, 40(2), 193-201. doi:10.1037/0003-066X.40.2.193
- Rojo, L., Ruiz, E., Dominguez, J. A., Calaf, M., & Livianos, L. (2006). Comorbidity between obesity and attention deficit/hyperactivity disorder: Population study with 13-15-year-olds [Electronic version]. *International Journal of Eating Disorders*, 39(6), 519-522. doi:10.1002/eat.20284
- Rosval, L., Steiger, H., Bruce, K., Israel, M., Richardson, J., & Aubut, M. (2006). Impulsivity in women with eating disorders: Problem of response inhibition, planning, or attention? [Electronic version] *International Journal of Eating Disorders*, 39(7), 590-593. doi:10.1002/eat.20296
- Steiger, H., Lehoux, P., & Gauvin, L. (1999). Impulsivity, dietary control and the urge to binge in bulimic syndromes [Electronic version]. *International Journal of Eating Disorders*, 26(3), 261-274. doi:10.1002/(SICI)1098-108X(199911)26:3<261::AID-EAT3>3.0.CO;2-Y
- Stice, E., Fisher, M., & Martinez, E. (2004). Eating disorder diagnostic scale: Additional evidence of reliability and validity [Electronic version]. *Psychological Assessment*, 16(1), 60-71. doi:10.1037/1040-3590.16.1.60
- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the Eating Disorder Diagnostic Scale: A brief self-report measure of anorexia, bulimia and binge-eating disorder [Electronic version]. *Psychological Assessment*, 12(2), 123-131. doi:10.1037/1040-3590.12.2.123
- Wonderlich, S. A., Connolly, K. M., & Stice, E. (2004). Impulsivity as a risk factor for eating disorder behavior: Assessment implications with adolescents [Electronic version]. *International Journal of Eating Disorders*, 36(2), 172-182. doi:10.1002/eat.20033
- Zinchuk, J.C., Noe, K.M., & Gerdes, A.C. (2007, August). The differential effect of childhood inattention versus hyperactivity/impulsivity on parenting stress and behavior in families of children with ADHD. Poster presented at the conference of the American Psychological Association, San Francisco, California.