

2014

Profiles of Binge Eating: The Interaction of Depressive Symptoms, Eating Styles, and Body Mass Index

Tyler B. Mason
Old Dominion University

Robin J. Lewis
Old Dominion University, rlewis@odu.edu

Follow this and additional works at: https://digitalcommons.odu.edu/psychology_fac_pubs

 Part of the [Clinical Psychology Commons](#), and the [Psychiatry Commons](#)

Repository Citation

Mason, Tyler B. and Lewis, Robin J., "Profiles of Binge Eating: The Interaction of Depressive Symptoms, Eating Styles, and Body Mass Index" (2014). *Psychology Faculty Publications*. 80.
https://digitalcommons.odu.edu/psychology_fac_pubs/80

Original Publication Citation

Mason, T. B., & Lewis, R. J. (2014). Profiles of binge eating: The interaction of depressive symptoms, eating styles, and body mass index. *Eating Disorders*, 22(5), 450-460. doi:10.1080/10640266.2014.931766

Profiles of Binge Eating: The Interaction of Depressive Symptoms, Eating Styles, and Body Mass Index

TYLER B. MASON

Department of Psychology, Old Dominion University, Norfolk, Virginia, USA

ROBIN J. LEWIS

Department of Psychology; and Virginia Consortium Program in Clinical Psychology, Old Dominion University, Norfolk, Virginia, USA

Binge eating is associated with depressive symptoms, eating styles, and obesity. However, less is known about interactions between these variables and binge eating. This study examined the relationship between depressive symptoms, eating styles, body mass index, and binge eating. Individuals with a higher body mass index, who reported more depressive symptoms and more external eating, reported the greatest binge eating. Similarly, individuals with a higher body mass index who reported more depressive symptoms and more emotional eating reported the greatest binge eating. These findings demonstrate possible profiles of individuals most at risk for binge eating and associated eating disorders.

Binge eating involves consuming abnormally high quantities of food in a short period of time with a felt loss of control. This type of eating behavior may be associated with binge eating disorder (BED) or bulimia nervosa (BN) (American Psychiatric Association, 2013), disorders with serious mental and physical health consequences. Binge eating can occur in both nonobese and obese individuals (Carrard, Van der Linden, & Golay, 2012). Strong evidence suggests associations (i.e., zero-order relationships) between binge eating and both depressive symptoms and eating styles (i.e., emotional eating and external eating) (Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003; Schulz & Laessle, 2010; Stice, Presnell, & Spangler, 2002). A recent study, however,

Address correspondence to Tyler B. Mason, Department of Psychology, Old Dominion University, Norfolk, VA 23529, USA. E-mail: tmaso008@odu.edu

reported weak correlations between body mass index (BMI) and binge eating (Saules et al., 2009). One possible explanation for these mixed findings is that eating styles and depressive symptoms in combination may relate to binge eating and this interaction may differ as a function of BMI. Because of the deleterious outcomes associated with both binge eating and increased BMI, it is important to delineate how BMI and binge eating are related. This study examined the relationship among binge eating, depressive symptoms, eating styles, and BMI.

Binge eating is associated with negative mental and physical health outcomes. Specifically, an analysis of the National Comorbidity Survey Replication revealed that individuals with BN and BED had similar comorbidities including anxiety disorders, mood disorders, impulse control disorders, and substance abuse disorders (Hudson, Hiripi, Pope, & Kessler, 2007). Furthermore, obese individuals who engaged in binge eating reported significantly greater health dissatisfaction and more major medical conditions compared to obese individuals who did not engage in binge eating (Bulik, Sullivan, & Kendler, 2002). Additionally, obese individuals who engaged in binge eating were at greater risk for major depression, panic disorder, phobia, and alcohol dependence compared to obese individuals who did not engage in binge eating (Bulik et al., 2002). Thus, it appears that engaging in binge eating is associated with mental health problems and, importantly, that binge eating appears to be associated with more negative mental and physical health outcomes compared to obesity alone.

The nature of the relationship among depression, obesity, and binge eating is unclear. For example, depression greatly increased the odds of BED with or without obesity but was not associated with obesity without BED (Grucza, Przybeck, & Cloninger, 2009) suggesting depression was more strongly related to binge eating than to obesity. In another study, however, obese individuals with BED reported more depressive symptoms than nonobese individuals with BED (Barry, Grilo, & Masheb, 2003) suggesting a primary role of obesity vs. binge eating in depression. To complicate matters further, some studies found no differences in depression or depressive symptoms between nonobese and obese individuals with BED (Didie & Fitzgibbon, 2005; Dingemans & van Furth, 2012). Therefore, it is necessary to investigate other predictors of binge eating such as eating styles (Pinaquy et al., 2003; Schulz & Laessle, 2010; Stice et al., 2002) that may clarify the relationship among depressive symptoms, BMI, and binge eating.

Eating styles refer to characteristic patterns of eating such as emotional eating (i.e., eating in response to emotional cues) and external eating (i.e., eating in response to external cues; van Strien, Frijters, Bergers, & Defares, 1986). Emotional eating predicted the onset of binge eating in adolescent girls (Stice et al., 2002). Furthermore, among adolescents and adults, emotional and external eating were associated with binge eating and upset feelings (Davis, Levitan, Smith, Tweed, & Curtis, 2006; Deaver, Miltenberger, Smyth, Meidinger, & Crosby, 2003; Wardle et al., 1992).

These studies demonstrate that eating styles are associated with binge eating and possibly with depressive symptoms. However, previous research often examines BED vs. non-BED groups opposed to using a continuous binge eating variable that assesses episodes of binge eating. Thus, we know less about the relationship among depression, obesity, and binge eating among individuals in a non-clinical sample who engage in binge eating and the relationship among depression, obesity, and binge eating along a continuum. Examining the continuum of binge eating in a non-clinical sample is essential in order to develop appropriate prevention efforts. Although both depressive symptoms and eating styles are predictors of binge eating, to our knowledge, differences in the association between depressive symptoms and binge eating as a function of both eating styles and BMI have not yet been examined. This study adds to the literature by examining how predictors of binge eating interact to predict greatest risk for increased binge eating along a continuum in a non-clinical sample. We expected binge eating to be associated with depressive symptoms and eating styles. We also hypothesized two three-way interactions such that individuals reporting more depressive symptoms and emotional eating or external eating were expected to differ in binge eating as a function of BMI.

METHOD

Participants

Six-hundred twenty-five undergraduate students at a large Mid-Atlantic university were recruited through the psychology department participant pool and received research credit for completing an online survey. The research was approved by the College's Human Subjects Committee. The sample consisted of more women ($n = 481$; 77%) than men ($n = 144$; 23%) with a mean age of 22 years (range 18–58 years). The sample was 46% White, 35% Black, 2% Asian, 1% American Indian or Alaskan Native, 1% Native Hawaiian or Pacific Islander, 3% some other race, and 12% two or more races. Ninety-two percent of the sample identified as non-Hispanic and 8% identified as Hispanic. Based on BMI, 24.8% of the sample was overweight ($25 \leq \text{BMI} \leq 29.9$) and 17.4% was obese ($\text{BMI} \geq 30$).

Measures

Binge eating. The goal in this study was to assess the behavioral component of binge eating (i.e., eating behavior) without confounding affect (e.g., depression, anxiety, or body shame). Thus, to isolate binge eating behavior, we focused on the behavioral characteristics of binge eating (i.e., the act of consuming food). Using the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; American Psychiatric Association, 2013) definition of a binge eating episode, binge eating was measured by asking participants to

indicate how many days in the past 7 days they “rapidly consumed an excessive amount of food with an experience of loss of control.” As a result, their response could range from 1 to 7.

Depressive symptoms. The Center for Epidemiological Studies Depression Scale–Short Form (CES-D; Andresen, Malmgren, Carter, & Patrick, 1994) assessed depressive symptoms in the past week. Participants responded to 10 items using a response scale ranging from 1 (*rarely or none of the time*) to 4 (*most or all of the time*). A sample item is “I felt depressed.” Zhang et al. (2012) reported good internal consistency for the measure (Cronbach’s $\alpha = .88$) and a strong correlation with the original long-form CES-D, $r = .97$. The Cronbach’s α in the current study was .79.

Eating styles. The Dutch Eating Behaviors Questionnaire (DEBQ; van Strien et al., 1986) assessed emotional eating (9 items) and external eating (10 items). Participants used a scale ranging from 1 (*never*) to 5 (*very often*) to respond to items such as “Do you have a desire to eat when you are irritated?” (emotional) and “If food tastes good to you, do you eat more than usual?” (external). The DEB-Q demonstrated adequate reliability and factor validity (van Strien et al., 1986). The Cronbach’s α for the emotional eating and external eating subscales in this study were .94 and .82, respectively.

RESULTS

Descriptive Statistics

The variables included in the study were depressive symptoms ($M = 19.12$, $SD = 5.26$), emotional eating ($M = 19.26$, $SD = 8.05$), external eating ($M = 30.45$, $SD = 6.50$), BMI ($M = 25.39$, $SD = 6.02$), and binge eating ($M = .75$, $SD = 1.35$). Based on 5000 bootstrap samples, binge eating was significantly correlated with emotional eating, $r = .29$, 95% CI = [.19, .38], external eating, $r = .23$, 95% CI = [.13, .32], and depressive symptoms, $r = .23$, 95% CI = [.15, .32]. Binge eating was not correlated with BMI, $r = .03$, 95% CI = [−.04, .11].

Statistical Analysis

Predictor variables were centered to reduce multicollinearity and gender was controlled for in two bootstrapped multiple regression analyses: 1) depressive symptoms, external eating, and BMI predicting binge eating and 2) depressive symptoms, emotional eating, and BMI predicting binge eating. A significant three-way interaction was found for depressive symptoms, external eating, and BMI (see Table 1). A significant three-way interaction was also found for depressive symptoms, emotional eating, and BMI (see Table 2). The three-way interactions and significant simple slopes are displayed in Figures 1 and 2.

TABLE 1 Interaction Among Depressive Symptoms, External Eating, and BMI Predicting Binge Eating

Item	B	<i>B</i>	CI	R	R ²	<i>F</i>
Gender	.12	.09	[.04, .20]	.37	.14	12.26*
External eating	.04	.19	[.02, .06]			
Depressive symptoms	.05	.19	[.03, .07]			
BMI	-.002	-.007	[-.02, .02]			
External eating × BMI	.001	.04	[-.001, .005]			
External eating × Depressive symptoms	.004	.11	[.001, .006]			
BMI × Depressive symptoms	.002	.04	[-.002, .005]			
External eating × Depressive symptoms × BMI	.001	.17	[.001, .002]			

*Note: $p < .001$. For predictors, CIs that do not include 0 are significant.

TABLE 2 Interaction Among Depressive Symptoms, Emotional Eating, and BMI Predicting Binge Eating

Item	B	<i>B</i>	CI	R	R ²	<i>F</i>
Gender	.08	.06	[-.01, .17]	.39	.15	13.36*
Emotional eating	.04	.22	[.02, .05]			
Depressive symptoms	.04	.14	[.02, .06]			
BMI	-.006	-.03	[-.02, .01]			
Emotional eating × BMI	-.001	.01	[-.002, .003]			
Emotional eating × Depressive symptoms	.002	.09	[.001, .005]			
BMI × Depressive symptoms	.001	.03	[-.002, .005]			
Emotional eating × Depressive symptoms × BMI	.001	.18	[.001, .002]			

*Note: $p < .001$. For predictors, CIs that do not include 0 are significant.

DISCUSSION

This study examined the interaction among depressive symptoms, eating styles, and BMI on binge eating behavior. As predicted, and consistent with previous research (e.g., Pinaquy et al., 2003; Schulz & Laessle, 2010; Stice et al., 2002), binge eating was positively correlated with depressive symptoms, external eating, and emotional eating, but was not correlated with BMI.

The interactions among depressive symptoms, eating styles, and BMI revealed that individuals with a higher BMI who reported more external or emotional eating, and more depressive symptoms, engaged in the most binge eating. These results suggest that increased BMI is indeed a risk factor for binge eating, in combination with other characteristics, even though the zero-order association is quite small. Furthermore, our findings suggest a possible profile for individuals at risk for eating disorders associated with binge eating, especially BED. Essentially, maladaptive eating styles may serve

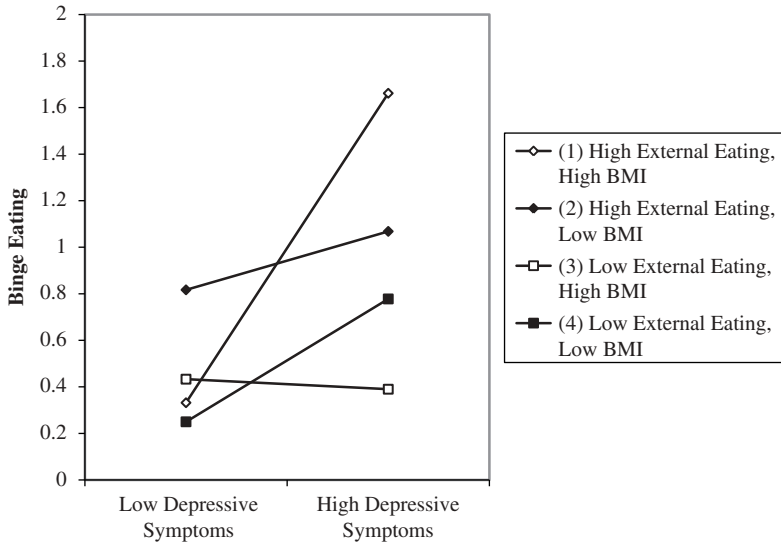


FIGURE 1 3-way interaction between depressive symptoms, external eating, and body mass index (BMI). Slope 1 significantly different from slopes 2, 3, and 4, $p < .01$; slope 4 significantly different from slope 3, $p < .01$.

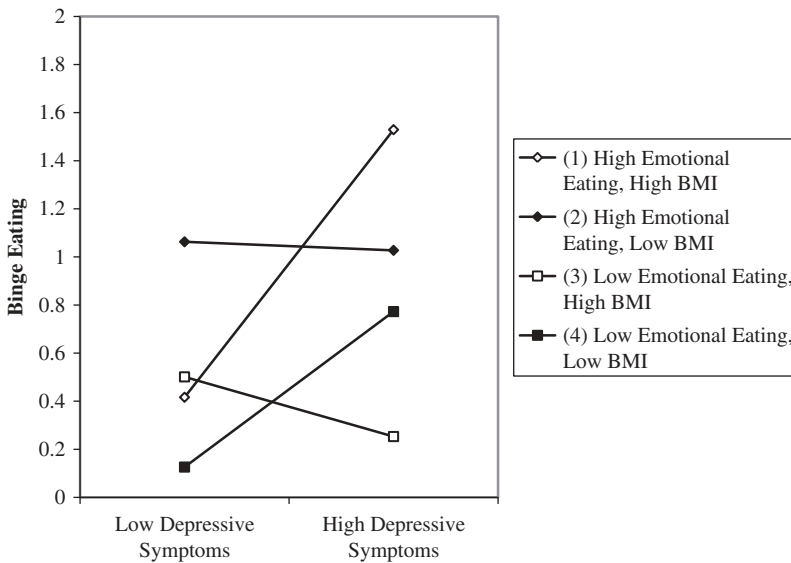


FIGURE 2 3-way interaction between depressive symptoms, emotional eating, and body mass index (BMI). Slope 1 significantly different from slopes 2 and 3, $p < .01$; slope 4 significantly different from slopes 2 and 3, $p < .01$.

Downloaded by [50.200.230.124] at 22:44 26 August 2015

as a predisposing factor for binge eating among individuals with a high BMI and depressive symptoms may serve to precipitate binge eating in individuals with a higher BMI who exhibit maladaptive eating styles. This pathway to binge eating is consistent with previous research findings that depressive symptoms act as a precipitating factor to binge eating (Haedt-Matt & Keel, 2011). As a result, from a clinical perspective, reducing depressive symptoms may be a worthwhile goal in order to decrease binge eating in this at-risk group. However, failure to address maladaptive eating styles may result in a relapse in binge eating if depressive symptoms reoccur.

Among individuals with a higher BMI who reported lower emotional or external eating, depressive symptoms were not salient in predicting binge eating. Thus, adaptive eating styles may serve as a type of buffer against binge eating. From a clinical perspective, these results suggest that among individuals with a higher BMI, interventions should include modules focused on adaptive eating styles.

For individuals with a lower BMI, more emotional or external eating was associated with more binge eating when individuals reported low depressive symptoms. However, when individuals with a lower BMI reported more depressive symptoms, binge eating became more similar regardless of emotional or external eating. Thus, a different pattern emerges among individuals with a lower BMI such that *either* depressive symptoms or maladaptive eating styles might increase binge eating.

The interaction among depressive symptoms, eating styles, and BMI may also help clarify inconsistencies in previous research. According to Grucza et al. (2009), depressive symptoms were a risk factor for BED with or without obesity. However in the current study, this relationship differed depending on eating styles. Depressive symptoms were most salient in predicting increased binge eating among the high BMI, high emotional or external eating and low BMI, low external or emotional eating groups. Consistent with previous research (Didie & Fitzgibbon, 2005; Dingemans & van Furth, 2012), the relationship between binge eating and depressive symptoms is substantial regardless of BMI. All groups, except the group reporting low BMI and high external or emotional eating, that reported low depressive symptoms engaged in markedly low binge eating.

Overall, we demonstrated that high BMI is an important risk factor for binge eating in combination with depressive symptoms and emotional or external eating among a non-clinical sample. This finding may explain why behavioral weight loss treatments alone have not proven effective in reducing binge eating (Iacovino, Gredysa, Altman, & Wilfley, 2012) as they do not target depressive symptoms and eating styles. Therefore, it is important for clinicians working with overweight and obese individuals to assess binge eating patterns, eating styles, and depressive symptoms and modify their interventions accordingly.

The high BMI, high emotional or external eating, high depressive symptoms groups engaged in considerably more binge eating than the other three groups. However because depressive symptoms or eating styles were somewhat associated with increased binge eating among individuals with low and high BMIs, prevention efforts targeted to individuals of varied BMIs would be beneficial in reducing binge eating in community programs. Treatment and intervention efforts aimed at reducing depressive symptoms and enhancing adaptive eating styles, in conjunction with reducing BMI would likely decrease risk for binge eating and its associated disorders. For example, an appetite awareness intervention that focused on eating in response to internal, as opposed to external, hunger cues significantly decreased binge eating, depressive symptoms, and urges to eat in response to salient food and affective cues (Allen & Craighead, 1999). In addition, although cognitive behavioral therapy and interpersonal therapy are widely used and effective therapies for reducing binge eating and depressive symptoms (Iacovino et al., 2012; Wilfley et al., 2002), the current study demonstrated that appetite awareness interventions may be useful either alone or in combination with other therapies. Furthermore, adding a weight loss component to established binge eating interventions may prove even more effective among overweight individuals. A recent internet-based treatment study for binge eating, including cognitive behavioral therapy, appetite awareness training, and behavioral weight loss, led to significant reductions in BMI, binge eating, and weight and shape concerns post treatment (Jones et al., 2008). Jones et al. (2008) provide preliminary support for the efficacy of integrated intervention in treating binge eating; although, there was no reduction in depressive symptoms and changes in eating styles were not measured. Based on the results of the current study, it is possible that failure to reduce depressive symptoms and maladaptive eating styles could eventually lead to relapse in binge eating. Finally, the aforementioned intervention efforts could be adapted into prevention and early intervention models that would prove useful in non-clinical settings such as college campuses.

Although the results of this study make an important contribution to the literature, there were several noteworthy limitations. All variables were measured cross-sectionally; therefore, no causal associations can be determined. Examining binge eating among college students is important due to the marked prevalence of eating disorder symptoms among college students (Eisenberg, Nicklett, Roeder, & Kirz, 2011). Although our college student sample was quite diverse with regards to race/ethnicity, our findings may not generalize to the larger population in terms of age, education, and income. Additional research with diverse populations along these dimensions is necessary to replicate these findings. Furthermore, participants self-reported their height and weight which may not be as accurate as externally validated measurements.

In conclusion, our results suggest a possible risk profile for binge eating behavior for individuals with higher BMI, maladaptive eating styles, and depressive symptoms, however, further research is necessary to determine if this profile is associated with clinical diagnoses of bulimia nervosa or BED. Future research is necessary to understand better what it is specifically about high BMI, when paired with more depressive symptoms and emotional eating or external eating, that is associated with binge eating. For example, BMI may be a substitute for another variable such as body shame or dietary restraint. The results of this study help us reconcile some of the seemingly conflictual information about the relationship between BMI and binge eating. It appears that a constellation of characteristics including depression and eating styles in conjunction with BMI confer greatest risk for binge eating. Indeed, the association between BMI and binge eating is complex. Additional research into other characteristics that confer risk is an important area for future investigation.

REFERENCES

- Allen, H. N., & Craighead, L. W. (1999). Appetite monitoring in the treatment of binge eating disorder. *Behavior Therapy, 30*, 253–272. doi:10.1016/S0005-7894(99)80007-0
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American Journal of Preventive Medicine, 10*, 77–84.
- Barry, D. T., Grilo, C. M., & Masheb, R. M. (2003). Comparison of patients with bulimia nervosa, obese patients with binge eating disorder, and nonobese patients with binge eating disorder. *The Journal of Nervous and Mental Disease, 191*, 589–594. doi:10.1097/01.nmd.0000087185.95446.65
- Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2002). Medical and psychiatric morbidity in obese women with and without binge eating. *International Journal of Eating Disorders, 32*, 72–78. doi:10.1002/eat.10072
- Carrard, I., Van der Linden, M., & Golay, A. (2012). Comparison of obese and nonobese individuals with binge eating disorder: Delicate boundary between binge eating disorder and non-purging bulimia nervosa. *European Eating Disorders Review, 20*, 350–354. doi:10.1002/erv.2174
- Davis, C., Levitan, R. D., Smith, M., Tweed, S., & Curtis, C. (2006). Associations among overeating, overweight, and attention deficit/hyperactivity disorder: A structural equation modelling approach. *Eating Behaviors, 7*, 266–74. doi:10.1016/j.eatbeh.2005.09.006
- Deaver, C. M., Miltenberger, R. G., Smyth, J., Meidinger, A., & Crosby, R. (2003). An evaluation of affect and binge eating. *Behavior Modification, 27*, 578–599. doi:10.1037/a0023660

- Didie, E. R., & Fitzgibbon, M. (2005). Binge eating and psychological distress: Is the degree of obesity a factor? *Eating Behaviors*, *6*, 35–41. doi:10.1016/j.eatbeh.2004.08.007
- Dingemans, A. E., & van Furth, E. F. (2012). Binge eating disorder psychopathology in normal weight and obese individuals. *International Journal of Eating Disorders*, *45*, 135–138. doi:10.1002/eat.20905
- Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. *Journal of American College Health*, *59*, 700–707. doi:10.1080/07448481.2010.546461
- Gruza, R. A., Przybeck, T. R., & Cloninger, C. R. (2009). Prevalence and correlates of binge eating disorder in a community sample. *Comprehensive Psychiatry*, *48*, 124–131.
- Haedt-Matt, A. A., & Keel, P. K. (2011). Revisiting the affect regulation model of binge eating: A meta-analysis of studies using ecological momentary assessment. *Psychological Bulletin*, *137*, 660–681. doi:10.1037/a0023660
- Hudson, J., Hiripi, E., Pope, H., & Kessler, R. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, *61*, 348–358. doi:10.1016/j.biopsych.2012.05.018
- Iacovino, J. M., Gredysa, D. M., Altman, M., & Wilfley, D. E. (2012). Psychological treatments for binge eating disorder. *Current Psychiatry Reports*, *14*, 432–446. doi:10.1007/s11920-012-0277-8
- Jones, M., Luce, K. H., Osborne, M. I., Taylor, K., Cunning, D., Doyle, A. C., . . . Taylor, C. B. (2008). Randomized, controlled trial of an internet-facilitated intervention for reducing binge eating and overweight in adolescents. *Pediatrics*, *121*, 453–62. doi:10.1542/peds.2007-1173
- Pinaquy, S., Chabrol, H., Simon, C., Louvet, J. P., & Barbe, P. (2003). Emotional eating, alexithymia, and binge-eating disorder in obese women. *Obesity Research*, *11*, 195–201. doi:10.1038/oby.2003.31
- Saules, K. K., Collings, A. S., Hoodin, F., Angelella, N. E., Alschuler, K., Ivezaj, V., . . . Wiedemann, A. A. (2009). The contributions of weight problem perception, BMI, gender, mood, and smoking status to binge eating among college students. *Eating Behaviors*, *10*, 1–9. doi:10.1016/j.eatbeh.2008.07.010
- Schulz, S., & Laessle, R. G. (2010). Associations of negative affect and eating behaviour in obese women with and without binge eating disorder. *Eating and Weight Disorders*, *15*, e287–293.
- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology*, *21*, 131–138. doi:10.1037//0278-6133.21.2.131
- van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, *5*, 295–315. doi:10.1002/1098-108X(198602)5:2<295::AID-EAT2260050209>3.0.CO;2-T\3182(71)7147
- Wardle, J., Marsland, L., Sheikh, Y., Quinn, M., Fedoroff, I., & Ogden, J. (1992). Eating style and eating behaviour in adolescents. *Appetite*, *18*, 167–183. doi:10.1016/01956663(92)90195-C

- Wilfley, D. E., Welch, R. R., Stein, R. I., Spurrell, E. B., Cohen, L. R., Saelens, B. E., . . . Matt, G. E. (2002). A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. *Archives of General Psychiatry*, *59*, 713–721. doi:10.1001/archpsyc.59.8.713.
- Zhang, W., O'Brien, N., Forrest, J. I., Salters, K. A., Patterson, T. L., Montaner, J. S., . . . Lima, V. D. (2012). Validating a shortened depression scale (10 item CES-D) among HIV-positive people in British Columbia, Canada. *PloS ONE*, *7*(7), e40793. doi:10.1371/journal.pone.0040793