



# Emotion regulation difficulties, but not negative urgency, are associated with attention-deficit/hyperactivity disorder and eating disorder symptoms in undergraduate students



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## ABSTRACT

Eating disorders and attention deficit/hyperactivity disorder (ADHD) are highly comorbid. The majority of research on this comorbidity has focused on impulsivity, which is a shared vulnerability between ADHD and eating disorders characterized by binge eating. Less is known about which shared factors may contribute to the co-occurrence of other eating disorders (i.e., anorexia nervosa, restricting subtype) and ADHD. Furthermore, little research has focused on other potential overlapping vulnerabilities, though deficits in emotion regulation have been implicated as an additional shared vulnerability. The current study ( $N = 306$  undergraduate students) uses path analysis to examine if emotion regulation difficulties and negative urgency (i.e., impulsivity during negative mood state) are unique or shared vulnerabilities for ADHD symptoms (inattention, hyperactivity-impulsivity) and eating disorder symptoms (bulimic symptoms, drive for thinness). Emotion regulation difficulties were uniquely associated with all dimensions of ADHD and eating disorder symptoms, and negative urgency was uniquely associated with global eating disorder symptoms, bulimic symptoms, and drive for thinness. These results suggest that emotion regulation difficulties are a shared vulnerability factor for the development of diverse presentations of ADHD and eating disorder symptoms, and may be an important prevention target. Additionally, our results support a unique relationship between negative urgency and drive for thinness. Future research should examine these associations prospectively and experimentally to determine directionality and inform preventative interventions for ADHD and eating disorders.

## 1. Introduction

Eating disorders (EDs) and attention deficit/hyperactivity disorder (ADHD) are frequently comorbid. Prevalence estimates suggest 3%–7.6% of individuals with ADHD have an ED (Bleck & DeBate, 2013; Brewerton & Duncan, 2016), and 11.1%–31.6% of individuals with an ED have a diagnosis of ADHD (Nazar et al., 2016; Yates, Lund, Johnson, Mitchell, & McKee, 2009). Beyond the high prevalence of comorbidity, research indicates that the co-occurrence of ADHD and EDs contributes to increased impairment and worse treatment outcomes (Biederman et al., 2007; Nazar et al., 2016). More research is needed to understand the development of these two co-occurring conditions in order to inform prevention efforts.

Research on ADHD and EDs has primarily focused on bulimic symptoms and suggests individuals with ADHD are at higher risk for binge eating and purging (Bleck & DeBate, 2013; Bleck, DeBate, &

Olivardia, 2015; Davis, Levitan, Smith, Tweed, & Curtis, 2006). Cognitive symptoms, such as drive for thinness (DT; i.e., extreme desire to be thinner, concerns about dieting, and weight gain fears; Garner, Olmstead, & Polivy, 1983) are far less researched. DT is implicated as a core symptom of EDs and precedes ED development (Stice, 2002), and thus represents an important factor to consider in developmental models of EDs. DT is especially important in understanding ADHD and ED comorbidity, as research indicates adolescents with ADHD have higher DT than healthy peers (Mikami et al., 2010; Neumark-Sztainer, Story, Resnick, Garwick, & Blum, 1995). Investigating DT, in addition to bulimic symptoms, may clarify what accounts for the comorbidity of ADHD and EDs not characterized by binge eating and purging behaviors (e.g., anorexia nervosa, restricting subtype).

The relationship between ED symptoms and ADHD is theorized to be explained, in part, by impulsivity. Impulsivity is one of three main ADHD features, along with hyperactivity and inattention (Stulz et al.,

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2013). Impulsivity also predicts eating pathology and bulimic symptoms (Mikami et al., 2010). One impulsivity facet in particular, negative urgency (NU; i.e., tendency to act rashly when experiencing negative mood), is especially important, as it is a risk factor for binge eating and for risky behaviors (e.g., substance use) in individuals with ADHD (Egan, Dawson, & Wymbs, 2017; Pearson, Zepolski, & Smith, 2015). Further, emotion regulation difficulties (ERD) are a transdiagnostic risk factor for EDs (regardless of diagnosis) and ADHD (Barkley, 2015; Steinberg & Drabick, 2015). Research suggests ERD may play a role in ADHD and ED comorbidity (Kaisari, Dourish, & Higgs, 2017), though no research to date has examined ERD and NU as potential shared vulnerabilities for the development of ADHD and ED symptoms.

The current study tested two developmental models of ADHD and ED symptoms, which include NU and ERD. The first model examined ADHD and ED symptoms broadly, and the second model examined associations with ADHD (inattention and hyperactivity-impulsivity) and ED symptoms (DT and bulimic symptoms). We hypothesized that ERD will be uniquely associated with all ED and ADHD symptoms. We also expected that NU will be uniquely associated with hyperactivity-impulsivity and bulimic symptoms, but not inattention or DT. Finally, we hypothesized that ERD and NU will explain some variance in the relationship between ADHD and ED symptoms.

## 2. Methods

### 2.1. Participants

Participants ( $N = 306$ ) were students at a Midwestern university, who completed surveys online for course credit. A college sample was used to test this research question, as NU and ERD are dimensional constructs, which may contribute to the development of ADHD/ED comorbidity. Testing this model in individuals with heterogeneous symptoms levels (as opposed to clinical samples) allows us to test models of risk. Participants ranged from 17 to 48 years-of-age ( $M = 19.49$ ,  $SD = 3.02$ ). There were 226 participants (73.9%) that identified as female, 74 (24.2%) identified as male, and four (1.3%) identified as another gender identity. Participants identified as European American (67.0%), African American (14.7%), multiracial (6.5%), Asian (5.2%), Hispanic (3.6%), and American Indian or Alaskan Native (1.0%). Six participants (1.9%) did not report ethnicity. There were 19 participants (6.2%) that self-reported having an ED diagnosis and ten participants (3.3%) self-reported having an ADHD diagnosis. No formal diagnoses were given.

### 2.2. Measures

#### 2.2.1. The UPPS Impulsive Behavior Scale (UPPS-P)

The UPPS-P (Whiteside & Lynam, 2001) is a dimensional measure of impulsive behavior. We used the NU factor, as it is the most salient pathway in EDs and one of the most salient in ADHD (Claes, Vandereycken, & Vertommen, 2005; Miller, Derefinko, Lynam, Milich, & Fillmore, 2010). The UPPS-P has good construct, divergent, and differential validity (Whiteside & Lynam, 2001). The NU scale displayed good internal consistency ( $\alpha = 0.89$ ).

#### 2.2.2. Difficulties in Emotional Regulation Scale (DERS)

The DERS (Gratz & Roemer, 2004) is a dimensional measure of ER. A global score was used for this study as a measure of ERD. The DERS has adequate construct validity and predictive validity, and good test-retest reliability (Gratz & Roemer, 2004). The DERS global score displayed excellent internal consistency ( $\alpha = 0.94$ ).

#### 2.2.3. The Eating Disorder Inventory-2 (EDI)

The EDI (Garner et al., 1983) is a measure of psychological features of EDs. We used two of the eleven EDI subscales for this study: DT and Bulimia Symptoms. EDI scores have good internal consistency and good

convergent and discriminant validity (Garner et al., 1983). The DT ( $\alpha = 0.90$ ) and bulimia symptoms scales ( $\alpha = 0.85$ ) exhibited good to excellent internal consistency.

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

The EDE-Q is a measure of cognitive-behavioral ED symptoms. The current study used the global score as a measure of ED symptoms. Participants endorsed a wide range of ED symptoms (0–5.24 out of maximum possible score of 6), with a mean of 1.75 ( $SD = 1.24$ ). 115 participants (31.9%) scored above the recommended clinical cut-off (2.3) for EDs (Mond, Hay, Rodgers, & Owen, 2006). The EDE-Q demonstrated good reliability and validity and good internal consistency (Mond, Hay, Rodgers, Owen, & Beumont, 2004). The EDE-Q global score internal consistency was excellent ( $\alpha = 0.95$ ).

#### 2.2.5. Attention deficit hyperactivity disorder measure

This study used an adapted version of the Barkley Adult ADHD Rating Scale-IV (BAARS; Barkley, 2011). Two scales (inattention and hyperactivity-impulsivity) reflect the two subtypes of ADHD symptoms. These scales were summed to reflect overall ADHD symptoms. Participants endorsed the full range of ADHD symptoms (0–72 out of maximum possible score of 72), with scores for 70 participants (26.6%) falling above the recommended clinical cutoff (10 or higher) on inattention and 93 (35.4%) on hyperactivity-impulsivity (Barkley, 2011). The BAARS demonstrated good psychometric properties and is an acceptable diagnostic tool for ADHD in adults (Caterino, Gómez-Benito, Balluerka, Amador-Campos, & Stock, 2009). The ADHD scales exhibited excellent internal consistency ( $\alpha = 0.90$ ).

### 2.3. Data analytic procedure

Two path models were estimated using the MLR estimator from Mplus Version 7.1 (Muthén & Muthén, 1998–2014). Associations in the path models represent unique relationships, accounting for all independent variables in the model (Garson, 2013). The first model examined the association of NU and ERD with ADHD and ED symptoms broadly. The second model examined the association of NU and ERD with inattention, hyperactivity-impulsivity, bulimic symptoms, and DT. Model fit was evaluated using the Comparative fit index (CFI; Bentler, 1990), Tucker-Lewis incremental fit index (TLI; Tucker & Lewis, 1973), root mean square error of approximation (RMSEA; Steiger & Lind, 1980), and standardized root mean square residual (SRMR; Bentler, 1990). CFI and TLI values  $> 0.95$  and RMSEA and SRMR values  $< 0.08$  are considered excellent fit (Hooper, Coughlan, & Mullen, 2008).

## 3. Results

### 3.1. Zero-order correlations

As seen in Table 1, all variables (NU, ERD, bulimic symptoms, DT, global ED symptoms, inattention, hyperactivity-impulsivity, and global ADHD symptoms) were significantly correlated at  $p \leq .002$ , without accounting for other variables in the model.

### 3.2. Path analysis

#### 3.2.1. Model 1

Model fit ranged from adequate to excellent (CFI = 0.98, TLI = 0.89, RMSEA = 0.08, SRMR = 0.02). As seen in Fig. 1A, ERD, but not NU, were uniquely associated with ADHD symptoms. NU and ERD were uniquely associated with ED symptoms. ADHD symptoms and ED symptoms were significantly correlated without accounting for other variables ( $p < .001$ ), but this relationship was non-significant ( $p = .58$ ) when ERD and NU were included, indicating these variables account for this variance.

**Table 1**  
Zero-order correlations among negative urgency, difficulties in emotion regulation, ADHD symptoms, bulimic symptoms, drive for thinness.

	Negative urgency	Emotion regulation difficulties	ADHD global	Bulimic symptoms	Drive for thinness	ED global	Inattention	Hyperactivity-impulsivity
Negative urgency	–							
Emotion regulation difficulties	0.57**	–						
ADHD global	0.34**	0.45**	–					
Bulimic symptoms	0.47**	0.46**	0.34**	–				
Drive for thinness	0.40**	0.42**	0.25**	0.67**	–			
ED global	0.39**	0.40**	0.22**	0.62**	0.82**	–		
Inattention	0.30**	0.42**	–	0.32**	0.20**	0.19*	–	
Hyperactivity-impulsivity	0.31**	0.42**	–	0.32**	0.24**	0.22**	0.77**	–

Note. ADHD = attention deficit/hyperactivity disorder. ED = eating disorder.

\*\* = values are significant at  $p < .001$ .

\* = values are significant at  $p = .002$ .

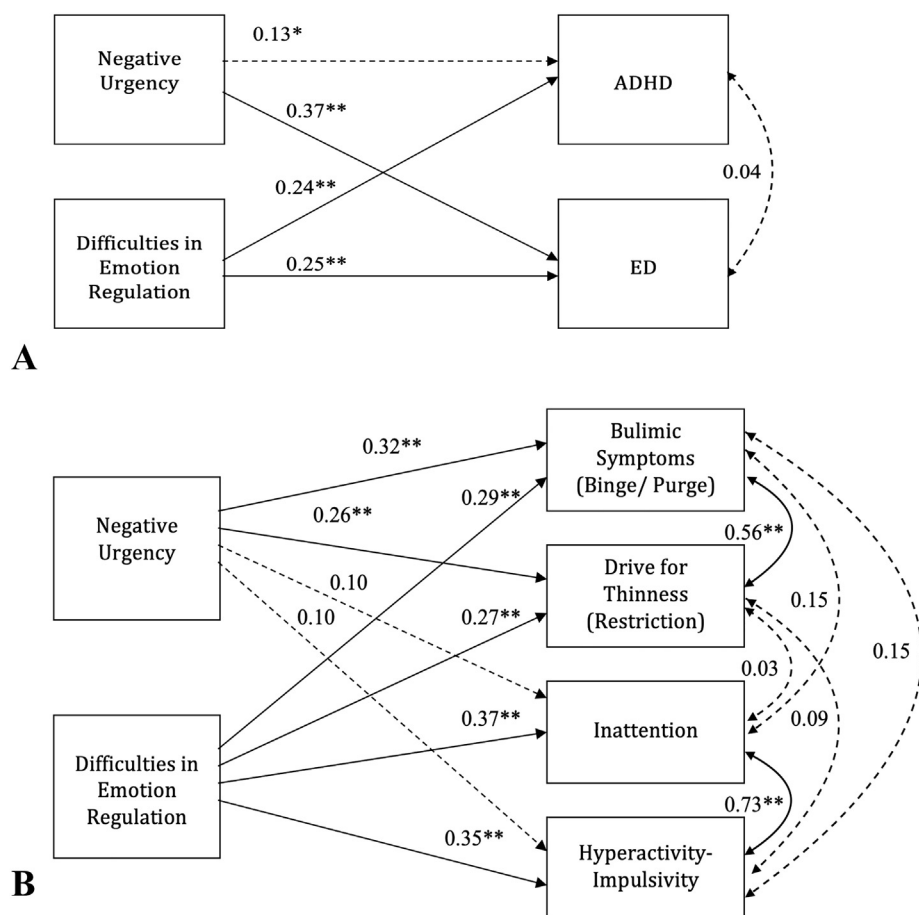
3.2.2. Model 2

The second path model had excellent fit (CFI = 1.00, TLI = 0.99, RMSEA = 0.02, SRMR = 0.02). As seen in Fig. 1B, ERD, but not NU, were uniquely associated with inattention and hyperactivity-impulsivity. NU and ERD were uniquely associated with bulimic symptoms and DT. There were no unique associations across types of ED symptoms (DT and bulimic symptoms) and ADHD dimensions (inattention and hyperactivity-impulsivity), while accounting for the variance from the independent variables in the model, implying NU and ERD account for this variance. ERD and NU were uniquely correlated ( $p < .001$ ) in both models.

4. Discussion

Consistent with our hypotheses, ERD were uniquely associated with all ED symptoms and ADHD symptoms. NU was uniquely associated with ED symptoms, bulimic symptoms, and DT, only. In both models, ADHD symptoms and ED symptoms were significantly correlated before accounting for ERD and NU, but not after accounting for their variance. Standardized beta weights indicate ERD explained 24–37% of the variance in ADHD and ED symptoms across both models; ERD may represent a shared vulnerability.

Our findings support that ERD are associated with both bulimia and DT, consistent with past research that found ERD to be a core factor of EDs, irrespective of diagnosis (Mallorquí-Bagué et al., 2018). Additionally, our findings support research showing ERD underlie core



**Fig. 1.** A) Model 1: path model of negative urgency, difficulties in emotion regulation, ADHD symptoms, ED symptoms and B) Model 2: path model of negative urgency, difficulties in emotion regulation, drive for thinness, bulimic symptoms, inattention, hyperactivity-impulsivity. Solid lines represent significant, unique pathways and dotted lines represent non-significant pathways at  $p > .05$ . \*\* =  $p < .001$ , \* =  $p < .10$ . ADHD = attention deficit/hyperactivity disorder. ED = eating disorder.

deficits and common comorbidities in ADHD (Martel, 2009; Martel & Nigg, 2006). ERD explained a significant portion of the variance in ADHD symptoms and ED symptoms, highlighting that it may be a shared pathway to both ADHD and ED symptoms. Pending replication in prospective data, individuals with high ERD may be more likely to develop both ADHD and EDs, compared to individuals with low ERD (Martel, 2009; Steinberg & Drabick, 2015).

NU was also associated with bulimic symptoms, in line with past research, which suggests a strong relationship between impulsivity and binge eating, especially when experiencing negative mood (Hege et al., 2015; Racine et al., 2015). However, NU was not associated with ADHD symptoms, when accounting for ERD, indicating that ERD may account for some of the relationship between ADHD symptoms and NU. Finally, this study provides evidence for the relationship between impulsivity and DT, suggesting impulsivity during negative mood states may contribute to individuals' cognitions about dieting, weight, and shape. As such, NU represents an important target across diverse ED presentations. Future research should investigate the mechanisms underlying the association between NU and DT.

Limitations include the cross-sectional design; we cannot determine from this study if ERD and impulsivity predict ED or ADHD symptoms over time. Future research should examine these relationships prospectively to test the directionality of these associations. Additionally, our sample comprised non-diagnosed students with a low prevalence of full-threshold disorders. However, testing this model in a nonclinical sample allows us to begin development of risk models, which would be impossible in a clinical sample, as they already developed the disorder/s. Further, although college is a high-risk period for ED development, ADHD symptoms in this population would likely have already developed. Future research should test these associations in different populations, including child/adolescent samples. Additionally, ERD and NU are transdiagnostic factors that span across many psychiatric disorders; the observed associations may be accounted for by other comorbid conditions characterized by ERD. Future research is needed to test if these findings are attributable to additional comorbidities. Finally, all data was self-report, and limited by attention, self-awareness, and self-report biases.

Overall, this study suggests ERD are a potential shared vulnerability for ED symptoms and ADHD symptoms. Our results also suggest that NU is a shared factor for diverse ED symptoms. Future research should investigate these associations across ED diagnoses, such as anorexia nervosa, as opposed to dimensional symptoms. Additionally, research should investigate the role of specific ERD and impulsivity dimensions in this comorbidity. Finally, research should test ERD as a prevention target for developing comorbid ED and ADHD. Developing effective preventative interventions for comorbid ADHD and EDs may decrease the prevalence and co-occurrence of both conditions.

## References

- Barkley, R. A. (2011). *Barkley adult ADHD rating scale-IV (BAARS-IV)*. Guilford Press.
- Barkley, R. A. (2015). Emotional dysregulation is a core component of ADHD. In R. A. Barkley (Ed.), *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (pp. 81–115). New York, NY, US: Guilford Press.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107, 238.
- 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. *Journal of Developmental & Behavioral Pediatrics*, 28, 302–307. <https://doi.org/10.1097/DBP.0b013e3180327917>.
- Bleck, J., & DeBate, R. D. (2013). Exploring the co-morbidity of attention-deficit/hyperactivity disorder with eating disorders and disordered eating behaviors in a nationally representative community-based sample. *Eating Behaviors*, 14, 390–393. <https://doi.org/10.1016/j.eatbeh.2013.05.009>.
- Bleck, J. R., DeBate, R. D., & Olivardia, R. (2015). The comorbidity of ADHD and eating disorders in a nationally representative sample. *The Journal of Behavioral Health Services & Research*, 42, 437–451. <https://doi.org/10.1016/j.eatbeh.2013.05.009>.
- Brewerton, T. D., & Duncan, A. E. (2016). Associations between attention deficit hyperactivity disorder and eating disorders by gender: Results from the national comorbidity survey replication. *European Eating Disorders Review*, 24, 536–540. <https://doi.org/10.1002/erv.2468>.
- Caterino, L. C., Gómez-Benito, J., Balluerka, N., Amador-Campos, J. A., & Stock, W. A. (2009). Development and validation of a scale to assess the symptoms of attention-deficit/hyperactivity disorder in young adults. *Psychological Assessment*, 21, 152. <https://doi.org/10.1037/a0015577>.
- Claes, L., Vandereycken, W., & Vertommen, H. (2005). Impulsivity-related traits in eating disorder patients. *Personality and Individual Differences*, 39, 739–749. <https://doi.org/10.1016/j.paid.2005.02.022>.
- 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, 266–274. <https://doi.org/10.1016/j.eatbeh.2005.09.006>.
- Egan, T. E., Dawson, A. E., & Wymbs, B. T. (2017). Substance use in undergraduate students with histories of attention-deficit/hyperactivity disorder (ADHD): The role of impulsivity. *Substance Use & Misuse*, 52, 1375–1386. <https://doi.org/10.1080/10826084.2017>.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363–370. [https://doi.org/10.1002/1098-108X\(199412\)16:4<363::AID-EAT2260160405>3.0.CO;2-%23](https://doi.org/10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-%23).
- Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, 2, 15–34. [https://doi.org/10.1002/1098-108X\(198321\)2:2<15::AID-EAT2260020203>3.0.CO;2-6](https://doi.org/10.1002/1098-108X(198321)2:2<15::AID-EAT2260020203>3.0.CO;2-6).
- Garson, G. D. (2013). *Path analysis*. Asheboro: Statistical Associates Publishing.
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 26, 41–54. <https://doi.org/10.1007/s10862-008-9102-4>.
- Hege, M. A., Stingl, K. T., Kullmann, S., Schag, K., Giel, K. E., Zipfel, S., & Preissl, H. (2015). Attentional impulsivity in binge eating disorder modulates response inhibition performance and frontal brain networks. *International Journal of Obesity*, 39, 353. <https://doi.org/10.1038/ijo.2014.99>.
- Hooper, D., Coughlan, J., & Mullen, M. (2008). *Structural equation modelling: Guidelines for determining model fit*. Articles, 2. <https://doi.org/10.21427/D7CF7R>.
- Kaisari, P., Dourish, C. T., & Higgs, S. (2017). Attention deficit hyperactivity disorder (ADHD) and disordered eating behaviour: A systematic review and a framework for future research. *Clinical Psychology Review*, 53, 109–121. <https://doi.org/10.1016/j.cpr.2017.03.002>.
- Mallorquí-Bagué, N., Vintró-Alcaraz, C., Sánchez, I., Riesco, N., Agüera, Z., Granero, R., & Fernández-Aranda, F. (2018). Emotion regulation as a transdiagnostic feature among eating disorders: Cross-sectional and longitudinal approach. *European Eating Disorders Review*, 26, 53–61. <https://doi.org/10.1002/erv.2570>.
- Martel, M. M. (2009). Research review: A new perspective on attention-deficit/hyperactivity disorder: Emotion dysregulation and trait models. *Journal of Child Psychology and Psychiatry*, 50, 1042–1051. <https://doi.org/10.1111/j.1469-7610.2009.02105.x>.
- Martel, M. M., & Nigg, J. T. (2006). Child ADHD and personality/temperament traits of reactive and effortful control, resiliency, and emotionality. *Journal of Child Psychology and Psychiatry*, 47, 1175–1183. <https://doi.org/10.1111/j.1469-7610.2006.01629.x>.
- Mikami, A. Y., Hinshaw, S. P., Arnold, L. E., Hoza, B., Hechtman, L., Newcorn, J. H., & Abikoff, H. B. (2010). Bulimia nervosa symptoms in the multimodal treatment study of children with ADHD. *International Journal of Eating Disorders*, 43, 248–259. <https://doi.org/10.1002/eat.20692>.
- Miller, D. J., Derefinko, K. J., Lynam, D. R., Milich, R., & Fillmore, M. T. (2010). Impulsivity and attention deficit-hyperactivity disorder: Subtype classification using the UPPS impulsive behavior scale. *Journal of Psychopathology and Behavioral Assessment*, 32, 323–332. <https://doi.org/10.1007/s10862-009-9155-z>.
- Mond, J. M., Hay, P. J., Rodgers, B., & Owen, C. (2006). Eating disorder examination questionnaire (EDE-Q): Norms for young adult women. *Behaviour Research and Therapy*, 44, 53–62. <https://doi.org/10.1016/j.brat.2004.12.003>.
- Mond, J. M., Hay, P. J., Rodgers, B., Owen, C., & Beumont, P. J. V. (2004). Validity of the eating disorder examination questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy*, 42, 551–567. [https://doi.org/10.1016/S0005-7967\(03\)00161-X](https://doi.org/10.1016/S0005-7967(03)00161-X).
- Muthén, L. K., & Muthén, B. (1998). *Mplus. The comprehensive modelling program for applied researchers: user's guide*. 5.
- Nazar, B. P., Bernardes, C., Peachey, G., Sergeant, J., Mattos, P., & Treasure, J. (2016). The risk of eating disorders comorbid with attention-deficit/hyperactivity disorder: A systematic review and meta-analysis. *International Journal of Eating Disorders*, 49, 1045–1057. <https://doi.org/10.1002/eat.22643>.
- Neumark-Sztainer, D., Story, M., Resnick, M. D., Garwick, A., & Blum, R. W. (1995). Body dissatisfaction and unhealthy weight-control practices among adolescents with and without chronic illness: A population-based study. *Archives of Pediatrics & Adolescent Medicine*, 149, 1330–1335. <https://doi.org/10.1001/archpedi.1995.02170250036005>.
- Pearson, C. M., Zapolski, T. C., & Smith, G. T. (2015). A longitudinal test of impulsivity and depression pathways to early binge eating onset. *International Journal of Eating Disorders*, 48, 230–237. <https://doi.org/10.1002/eat.22277>.
- Racine, S. E., Burt, S. A., Keel, P. K., Sisk, C. L., Neale, M. C., Boker, S., & Klump, K. L. (2015). Examining associations between negative urgency and key components of objective binge episodes. *International Journal of Eating Disorders*, 48, 527–531. <https://doi.org/10.1002/eat.22412>.
- Steiger, J. H., & Lind, J. C. (1980, May). *Statistically based tests for the number of factors*. Paper presented at the annual spring meeting of the Psychometric Society, Iowa City, IA.
- Steinberg, E. A., & Drabick, D. A. (2015). A developmental psychopathology perspective on ADHD and comorbid conditions: The role of emotion regulation. *Child Psychiatry &*

- Human Development*, 46, 951–966. <https://doi.org/10.1007/s10578-015-0534-2>.
- Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin*, 128, 825. <https://doi.org/10.1037/0033-2909.128.5.825>.
- Stulz, N., Hepp, U., Gächter, C., Martin-Soelch, C., Spindler, A., & Milos, G. (2013). The severity of ADHD and eating disorder symptoms: A correlational study. *BMC Psychiatry*, 13, 44. <https://doi.org/10.1186/1471-244X-13-44>.
- Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, 38, 1–10. <https://doi.org/10.1007/BF02291170>.
- Whiteside, S. P., & Lynam, D. R. (2001). The five factor model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, 30, 669–689. [https://doi.org/10.1016/S0191-8869\(00\)00064-7](https://doi.org/10.1016/S0191-8869(00)00064-7).
- Yates, W. R., Lund, B. C., Johnson, C., Mitchell, J., & McKee, P. (2009). Attention-deficit hyperactivity symptoms and disorder in eating disorder inpatients. *International Journal of Eating Disorders*, 42, 375–378. <https://doi.org/10.1002/eat.20627>.