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A Preliminary Examination of Loss of Control Eating Disorder (LOC-ED) in Middle Childhood

Camden E. Matherne, PhD^{1,2,4}, Marian Tanofsky-Kraff, PhD^{1,2}, Anne M. Altschul², Lisa M. Shank, MS^{1,2}, Natasha A. Schvey, PhD^{1,2}, Sheila M. Brady, MSN, CFNP², Ovidiu Galescu, MD², Andrew P. Demidowich, MD², Susan Z. Yanovski, MD^{2,3}, and Jack A. Yanovski, MD, PhD²

¹Uniformed Services University of the Health Sciences (USUHS)

²Section on Growth and Obesity, Program in Developmental Endocrinology and Genetics, *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, National Institutes of Health, DHHS

³Obesity and Eating Disorders Program, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, DHHS

Abstract

Loss of Control Eating Disorder (LOC-ED) has been proposed as a diagnostic category for children 6–12y with binge-type eating. However, characteristics of youth with LOC-ED have not been examined. We tested the hypothesis that the proposed criteria for LOC-ED would identify children with greater adiposity, more disordered eating attitudes, and greater mood disturbance than those without LOC-ED. Participants were 251 youth ($10.29y \pm 1.54$, 53.8% female, 57.8 % White, 35.5% Black, 2.0% Asian, 4.8% Hispanic, 53.0% overweight). Youth were interviewed regarding eating attitudes and behaviors, completed questionnaires to assess general psychopathology, and underwent measurements of body fat mass. Using previously proposed criteria for LOC-ED, children were classified as LOC-ED ($n = 19$), LOC in the absence of the full disorder (subLOC, $n = 33$), and youth not reporting LOC (noLOC, $n = 199$). LOC-ED youth had higher BMIz ($p = 0.001$) and adiposity ($p = 0.003$) and reported greater disordered eating concerns ($p < 0.001$) compared to noLOC youth. Compared to subLOC youth, LOC-ED youth had non-significantly higher BMIz ($p = 0.11$), and significantly higher adiposity ($p = 0.04$) and disordered eating attitudes ($p = 0.02$). SubLOC youth had greater disordered eating concerns ($p < 0.001$) and BMIz ($p = 0.03$) but did not differ in adiposity ($p = 0.33$) compared to noLOC youth. These preliminary data suggest that LOC-ED youth are elevated on disordered eating cognitions and anthropometric measures compared to youth without LOC-ED. Longitudinal studies are needed to determine if those with LOC-ED are at particularly increased risk for progression of disordered eating and excess weight gain.

Correspondence to: Marian Tanofsky-Kraff, PhD, Department of Medical and Clinical Psychology, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, MD 20814, TEL: 301-295-1482, marian.tanofsky-kraff@usuhs.edu.

⁴Current Address: University of North Carolina at Chapel Hill, Department of Psychiatry

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Keywords

binge eating; loss of control eating; obesity; prevention

1. Introduction

Binge eating disorder (BED) in adulthood is associated with psychological distress, social problems, obesity, and negative metabolic outcomes.¹ Although full-syndrome BED is rare during childhood, with prevalence estimates at 0–1%,² loss of control (LOC) eating, the hallmark feature of a binge episode, is prevalent. Some 9 to 30% of non-treatment-seeking middle childhood (6–13y) youth report the experience of LOC eating,³ defined in childhood as the experience of LOC while eating irrespective of the amount of food consumed. During childhood, LOC eating is associated with symptoms of anxiety and depression,³ social problems,⁴ and overweight status.⁵ Studies suggest that the prevalence of LOC eating in childhood does not differ based on sex, and that among boys and girls with reported LOC, there are few sex differences with regard to adiposity, disordered eating attitudes, or psychological symptoms.^{6–8} Notably, prospective data suggest that pediatric LOC eating predicts excess weight gain,^{9,10} exacerbated eating-related and general psychopathology, and the emergence of partial or full-syndrome BED.^{11–13} These data suggest that LOC is a salient marker of disordered eating and obesity in children that may be an important target in obesity and disordered eating prevention efforts.¹⁴

Approximately one-third to half of middle childhood youth reporting LOC at baseline continue to report LOC episodes approximately five years later.^{11,13} However, it remains unclear which youth are at greatest risk for worsened disordered eating behaviors and excessive weight gain. Given the challenges of assessing and diagnosing eating pathology in children, revision of the criteria for anorexia and bulimia nervosa focusing on developmentally-appropriate illness markers has been a long-standing area of discussion.^{15,16} In line with this work, provisional research criteria for BED adapted for children were proposed as a means of identifying a cluster of potentially high-risk youth presenting with BED-like symptoms, but not meeting full diagnostic criteria.¹⁷ Based on data from a multi-site investigation of pediatric LOC eating episodes,⁷ the BED criteria adapted for children were revised and termed “Loss of Control Eating Disorder” (LOC-ED) in children aged 6–12 years (Table 1).¹⁸

We therefore investigated the phenotype of children who meet the proposed LOC-ED criteria. We hypothesized that youth meeting LOC-ED criteria would have increased adiposity and exhibit greater disordered eating attitudes and more symptoms of anxiety and depression compared to youth with reported LOC who did not meet criteria for LOC-ED or to those with no reports of LOC. We further expected youth without LOC to be lower on these indices compared to youth with LOC who did not meet criteria for LOC-ED.

2. Materials and Methods

2.1 Participants and Procedure

Participants were a convenience sample of healthy youth participating in a non-intervention or a prevention of excess weight gain study in the Section on Growth and Obesity at the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), National Institutes of Health (NIH). Recruitment efforts and exclusion criteria for the non-intervention studies have been described in detail elsewhere.¹⁹ Prevention-seeking youth were overweight or obese youth ages 8–12y who endorsed 1 episode of LOC in the month prior to baseline assessment who were otherwise healthy. Children were excluded for current or past diagnosis of anorexia or bulimia nervosa. Children and parents provided written assent and consent, respectively. Studies were approved by the NICHD institutional review board.

Participants were seen at the NIH Hatfield Clinical Research Center. Fasting weight and height were measured, as previously described,⁵ to determine *body mass index* (BMI, kg/m²). *Body fat mass* was measured using either air displacement plethysmography or dual-energy x-ray absorptiometry (DXA), which have been successfully combined as described previously.¹⁹

2.2. Interview Assessment of LOC Eating and LOC-ED Criteria

The *Eating Disorder Examination version 12.0D/C.2*²⁰ adapted for children²¹ (ChEDE) was administered to each participant as described previously⁵ to assess disordered eating cognitions and behaviors. The ChEDE has been validated for children ages 8–14y²² and generates four scales: Restraint (cognitive and behavioral dietary restraint), Eating Concern (concern over one's eating behaviors), Shape Concern (concern over the shape of one's body), Weight Concern (concerns with one's body weight), and an average Global scale. All scale scores range from 0–6.²³ The ChEDE also includes assessment of objective and subjective binge episodes, which were combined to determine the total number of youth's LOC eating episodes in the month prior to assessment. ChEDE training, administration, and psychometrics are described elsewhere.⁵

Following the overeating section of the ChEDE, the *Standard Pediatric Eating Episode Interview (SPEEI)*⁷ was administered to all children regarding their self-described most pathological eating episode. The SPEEI, which has been implemented with youth ages 8–17y,⁷ queries about the context (e.g., where, time of day) and behavioral (e.g., pace of eating, amount compared to others), physical (e.g., whether hungry before, whether full after), and emotional (e.g., emotion before and after eating) characteristics of children's eating episodes. The SPEEI was used to assess the LOC-ED criteria (Table 1).

For this preliminary investigation, LOC-ED classification was based on the month prior to assessment, as data regarding the frequency of LOC episodes in the three months prior to assessment are not assessed by the ChEDE. In addition, in examining the originally proposed criteria for LOC-ED,¹⁸ we observed a redundancy in Criterion A2 (Food seeking in the absence of hunger or after satiation) and Criterion B4 (Eating more, or the perception of eating more, than others). To eliminate this redundancy, we combined these

characteristics under criterion B4. This alteration also has the benefit of more flexibly capturing pathological LOC eating in childhood, as youth may not consistently have access to large amounts of food.³ Youth who reported at minimum two episodes of LOC in the month prior to assessment and met criteria for LOC-ED based on the SPEEI were classified as LOC-ED. Youth who endorsed LOC eating not characterized by the LOC-ED criterion were classified as subLOC. Youth denying any episodes of LOC were classified as noLOC.

2.3 General Psychopathology

Depressive symptoms were assessed using the *Children's Depression Inventory*,²⁴ a 27-item self-report questionnaire that assesses depressive symptoms in youth ages 7–17 years. This measure generates five subscales (negative mood, interpersonal problems, ineffectiveness, anhedonia, negative self-esteem) and a total average of these subscales. For the purposes of this study, only the total score (range 0–54) was examined. For youth ages 8–13y, normative values are $M = 8.67$, $SD = 7.02$.²⁵ Total scores of 19 or greater are considered clinically significant.²⁵

Symptoms of anxiety were assessed with the trait-scale of the *State-Trait Anxiety Inventory for Children*,²⁶ a 20-item measure of trait anxiety for youth 9–12 years. Scores range from 20–80. Although no clear clinical cut-off has been published for the STAI-C, normative values are $M = 38.10$, $SD = 7.03$ for girls and $M = 36.30$, $SD = 6.80$ for boys.²⁶ Both measures have good psychometric properties.^{24,27}

2.4 Data Analysis

Analyses were performed with SPSS 22 (IBM, Armonk, NY). Data were examined to determine that all variables were normally distributed.²⁸ Outliers were adjusted to fall 1.5 times the interquartile range (IQR) above the 75th percentile.^a All scores had acceptable levels of skew and kurtosis except for the ChEDE Eating Concern subscale. Further, the value of the 75th percentile was zero, which prevented adjustment of outliers based on the overall IQR. Therefore, outliers were identified as any value greater than $1.5 \times$ the highest group IQR (subLOC group IQR = 1.0) such that any Eating Concern data point > 1.5 was recoded to 1.5 to adjust for the few extreme data points. Descriptive analyses were generated on all study variables. Dependent measures were examined with a univariate (ANCOVA) or multivariate (MANCOVA) analysis of covariance with contrast tests. To optimize statistical power, race and BMI z-score, which also accounts for age and sex, and intervention-seeking status were included as covariates for all analyses involving psychological dependent variables, as these factors have been associated with the dependent variables.^{5,29–32} Age, sex, race, height, and intervention-seeking status were covariates for the analysis of body fat. Effects were considered significant when $p \leq 0.05$, and all tests were two-tailed.

^aLevene's test for Equality of Variances was non-significant ($p > .05$) on all dependent variables with the exception of BMI z-score and the ChEDE Restraint, Eating Concern, Shape Concern, and Global subscales. As non-parametric tests on these variables mirrored the results of parametric tests, which adjust for relevant covariates, results from parametric tests are presented.

3. Results

Participants were 251 children ($10.29y \pm 1.54$, 53.8% female, 57.8 % White, 35.5% Black, 2.0% Asian, 4.8% Hispanic). Approximately half of youth were overweight (53.0%, BMI 85th percentile), and 6% of youth were intervention-seeking. Intervention-seeking youth were more likely to be overweight ($p < .001$) compared to non-intervention-seeking youth. Group means and standard deviations for the noLOC ($n = 199$), subLOC ($n = 33$), and LOC-ED ($n = 19$) groups are presented in Table 2. Groups did not differ with regard to age, sex, or race ($ps > .05$).

3.1 Anthropometric Measures

A main effect for BMI z-score was observed ($F_{(2,244)} = 6.37, p = 0.002$). Post-hoc analyses indicated that the noLOC group had a significantly lower mean BMI z-score compared to the subLOC group ($p = 0.03$) and the LOC-ED group ($p = .001$). LOC-ED youth had a non-significantly higher BMI z-score compared to the subLOC group ($p = 0.11$). There was also a main effect for body fat mass ($F_{(2,243)} = 4.42, p = 0.01$). The LOC-ED group had more adiposity than the noLOC ($p = 0.003$) and subLOC ($p = 0.04$) groups. Adiposity for the subLOC and noLOC groups did not differ significantly ($p = 0.33$).

3.2 Disordered Eating Attitudes and Behaviors

LOC-ED youth reported significantly more LOC episodes ($F_{(1,47)} = 7.86, p = 0.007$) and non-significantly more objective binge episodes ($F_{(1,47)} = 1.92, p = 0.17$) compared to subLOC youth. Main effects were observed on the ChEDE Global scale ($F_{(2,245)} = 21.43, p < 0.001$), as well as three of the subscales [Eating Concern ($F_{(2,245)} = 29.38, p < 0.001$), Shape Concern ($F_{(2,245)} = 20.92, p < 0.001$), Weight Concern ($F_{(2,245)} = 13.44, p < 0.001$)]. There was no main effect for the Restraint subscale ($F_{(2,245)} = 2.90, p = 0.057$). Post-hoc analyses revealed that LOC-ED youth had significantly higher Global scores compared to noLOC ($p < 0.001$) and subLOC youth ($p = 0.02$). SubLOC youth also reported higher Global scores compared to noLOC youth ($p < 0.001$). A similar pattern was observed on the Weight Concern and Shape Concern scales. On the Eating Concern scale, LOC-ED and subLOC youth reported significantly higher scores than noLOC youth ($ps < .001$). LOC-ED youth reported non-significantly higher scores compared to noLOC youth ($p = 0.09$).

3.3 Symptoms of General Psychopathology^b

There were significant between-group differences with regard to depressive symptoms ($F_{(2,244)} = 3.66, p = 0.03$). SubLOC youth reported more symptoms of depression compared to noLOC youth ($p = 0.02$) and LOC-ED youth ($p = 0.03$). LOC-ED youth did not differ significantly from noLOC youth ($p = 0.48$). There was no significant main effect for trait anxiety ($F_{(2,244)} = 3.01, p = 0.051$).

^bOne child in the LOC-ED group did not complete the CDI, and one child in the subLOC group did not complete the STAI-C.

4. Discussion

This study provides a preliminary investigation of the characteristics of youth meeting proposed criteria for LOC-ED. LOC-ED youth were distinguished from noLOC and subLOC youth on anthropometric measures. Youth with LOC-ED also reported the greatest disordered eating pathology, followed by the subLOC then noLOC groups. However, LOC-ED youth were not distinguished from subLOC and noLOC youth on measures of general psychopathology.

In line with prior data indicating that LOC is associated with overweight and elevated adiposity,⁵ subLOC and LOC-ED youth had elevated BMI z-scores relative to noLOC youth. Importantly, LOC-ED youth had significantly greater body adiposity compared to both subLOC and noLOC youth, who did not differ from each other on this measure. As body adiposity is considered a more precise measure of overweight and obesity,³³ these data suggest that the criteria for LOC-ED may have effectively distinguished the youth at greatest risk for excessive weight gain and associated health problems. These findings are consistent with a role for LOC eating as a factor contributing to the development of pediatric obesity, and highlight the importance of early identification of youth with pathological LOC eating for prevention efforts.

Results from the present study are also consistent with prior research evidencing that youth experiencing LOC report elevated disordered eating cognitions compared to youth without LOC.³ LOC-ED youth were significantly differentiated from subLOC and noLOC youth on the ChEDE Global, Weight Concern, and Shape Concern scales. As data suggest that these types of concerns hold particular significance in predicting future onset of partial- and full-syndrome eating disorders,^{34,35} results from the present study indicate that the proposed criteria for LOC-ED identified youth who may be at increased risk for disordered eating progression. Given shared risk factors³⁶ and the high level of diagnostic crossover^{37,38} among the classes of eating disorders, prospective studies will be important in typifying disordered eating outcomes among youth meeting criteria for LOC-ED.

Although negative affect is associated with pediatric LOC eating³ and an identified risk factor for eating disorders,³⁶ the criteria for LOC-ED did not identify youth who had elevated symptoms of general psychopathology. However, our sample was derived from non-treatment seeking or prevention-seeking youth, and although group means on measures of general psychopathology were statistically significant, values did not approach clinical significance. Since clinically significant depression commonly manifests in adolescence,²⁹ when neurological changes support higher-level cognitive processes,³⁹ symptoms of general psychopathology and their relation to disordered eating patterns may be emergent in middle childhood, especially among non-treatment seeking samples. Longitudinal research among youth reporting recurrent LOC episodes may further elucidate how emotion awareness and regulation contribute to the emergence of sub- or full-threshold symptoms of eating-related and general psychopathology.

Results from the present study did not reveal any significant sex differences among groups. These findings are consistent with emergent data suggesting that equal numbers of boys and

girls persist in LOC eating and progress to full- or sub-threshold BED.¹¹ Similarly, among adult samples, unlike anorexia and bulimia nervosa, BED prevalence more closely approaches equal representation between the sexes,⁴⁰ although our understanding of sex differences regarding associated eating-related and general psychological distress is limited. These findings underscore the importance of further research specifically examining any potential sex differences related to disordered overeating etiology and maintenance.

Strengths of this study include the use of interview methodology to assess for LOC eating, and actual, versus self-reported, anthropometric measurements. Further, the sample was racially diverse and equally represented both sexes. This study was limited by the small size of the LOC-ED and subLOC groups. Another limitation is that we were unable to fully examine the proposed frequency criterion for LOC-ED (≥ 2 LOC episodes per month for three months) as the ChEDE does not assess the frequency of LOC episodes in the three months prior to assessment. This study is further limited by its cross-sectional design, as results are correlational and have no predictive value.

In summary, the proposed criteria for LOC-ED may identify youth who have greater body adiposity and disordered eating attitudes, but not greater symptoms of general psychopathology. Future research is required to determine whether LOC-ED prospectively predicts exacerbated disordered eating symptoms and excessive weight gain.

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References

1. Wilfley DE, Wilson GT, Agras WS. The clinical significance of binge eating disorder. *International Journal of Eating Disorders*. 2003; 34(Suppl. 1):S96–S106. [PubMed: 12900990]
2. Decaluwé V, Braet C. Prevalence of binge-eating disorder in obese children and adolescents seeking weight-loss treatment. *International Journal of Obesity*. 2003; 27(3):404–409. [PubMed: 12629570]
3. Tanofsky-Kraff, M. Binge Eating Among Children and Adolescents. In: Jelalian, E.; Steele, RG., editors. *Handbook of Childhood and Adolescent Obesity*. Springer US; 2008. p. 43-59.
4. Elliott CA, Tanofsky-Kraff M, Shomaker LB, Columbo KM, Wolkoff LE, Ranzienhofer LM, et al. An examination of the interpersonal model of loss of control eating in children and adolescents. *Behavior Research and Therapy*. 2010
5. Tanofsky-Kraff M, Yanovski SZ, Wilfley DE, Marmarosh C, Morgan CM, Yanovski JA. Eating-disordered behaviors, body fat, and psychopathology in overweight and normal-weight children. *Journal of Consulting and Clinical Psychology*. 2004; 72(1):53–61. [PubMed: 14756614]
6. Tanofsky-Kraff M, Faden D, Yanovski SZ, Wilfley DE, Yanovski JA. The perceived onset of diet and loss of control eating behaviors in overweight children. *International Journal of Eating Disorders*. 2005; 38(2):112–122. [PubMed: 16134103]
7. Tanofsky-Kraff M, Goossens L, Eddy KT, Ringham R, Goldschmidt A, Yanovski SZ, et al. A multisite investigation of binge eating behaviors in children and adolescents. *Journal of Consulting and Clinical Psychology*. 2007; 75(6):901–913. [PubMed: 18085907]
8. Goossens L, Braet C, Decaluwé V. Loss of control over eating in obese youngsters. *Behavior Research and Therapy*. 2007; 45(1):1–9.

9. Tanofsky-Kraff M, Yanovski SZ, Schvey NA, Olsen CH, Gustafson J, Yanovski JA. A prospective study of loss of control eating for body weight gain in children at high risk for adult obesity. *International Journal of Eating Disorders*. 2009; 42(1):26–30. [PubMed: 18720473]
10. Field AE, Austin SB, Taylor CB, Malspeis S, Rosner B, Rockett HR, et al. Relation between dieting and weight change among preadolescents and adolescents. *Pediatrics*. 2003; 112(4):900–906. [PubMed: 14523184]
11. Tanofsky-Kraff M, Shomaker LB, Olsen C, Roza CA, Wolkoff LE, Columbo KM, et al. A prospective study of pediatric loss of control eating and psychological outcome. *Journal of Abnormal Psychology*. 2011; 120(1):108–118. [PubMed: 21114355]
12. Hilbert A, Hartmann AS, Czaja J, Schoebi D. Natural course of preadolescent loss of control eating. *Journal of Abnormal Psychology*. 2013; 122(3):684–693. [PubMed: 24016009]
13. Hilbert A, Brauhardt A. Childhood loss of control eating over five-year follow-up. *International Journal of Eating Disorders*. 2014; 47(7):758–761. [PubMed: 24899359]
14. Tanofsky-Kraff M, Wilfley DE, Young JF, Mufson L, Yanovski SZ, Glasofer DR, et al. Preventing excessive weight gain in adolescents: Interpersonal psychotherapy for binge eating. *Obesity*. 2007; 15(6):1345–1355. [PubMed: 17557971]
15. Bryant-Waugh R, Lask B. Eating disorders in children. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*. 1995; 36(2):191–202.
16. Bravender T, Bryant-Waugh R, Herzog D, Katzman D, Kriepe RD, Lask B, et al. Classification of eating disturbance in children and adolescents: Proposed changes for the DSM-V. *European Eating Disorders Review*. 2010; 18(2):79–89. [PubMed: 20151366]
17. Marcus MD, Kalarchian MA. Binge eating in children and adolescents. *International Journal of Eating Disorders*. 2003; 34(S1):S47–S57. [PubMed: 12900986]
18. Tanofsky-Kraff M, Marcus MD, Yanovski SZ, Yanovski JA. Loss of control eating disorder in children age 12 years and younger: Proposed research criteria. *Eating Behaviors*. 2008; 9(3):360–365. [PubMed: 18549996]
19. Shomaker LB, Tanofsky-Kraff M, Elliott C, Wolkoff LE, Columbo KM, Ranzenhofer LM, et al. Salience of loss of control for pediatric binge episodes: Does size really matter? *International Journal of Eating Disorders*. 2010; 43(8):707–716. [PubMed: 19827022]
20. Fairburn, CG.; Cooper, Z. The Eating Disorder Examination. In: Fairburn, CG.; Wilson, GT., editors. *Binge eating, nature, assessment and treatment*. 12th ed.. New York: Guilford; 1993. p. 317–360.
21. Bryant-Waugh RJ, Cooper PJ, Taylor CL, Lask BD. The use of the Eating Disorder Examination with children: A pilot study. *International Journal of Eating Disorders*. 1996; 19(4):391–397. [PubMed: 8859397]
22. Christie, D.; Watkins, B.; Lask, B. Anorexia nervosa and related eating disorders in childhood and adolescence. In: Lask, B.; Bryant-Waugh, R., editors. *Assessment*. Vol. 2. East Essex, UK: Psychology Press; 2000. p. 105–125.
23. Cooper Z, Cooper PJ, Fairburn CG. The validity of the eating disorder examination and its subscales. *The British Journal of Psychiatry*. 1989; 154(6):807–812. [PubMed: 2597887]
24. Kovacs M. The Children's Depression Inventory (CDI). *Psychopharmacology Bulletin*. 1995; 21(4):995–998. [PubMed: 4089116]
25. Smucker MR, Craighead WE, Craighead LW, Green BJ. Normative and reliability for the Children's Depression Inventory. *Journal of Abnormal Child Psychology*. 1986; 14(1):25–39. [PubMed: 3950219]
26. Spielberger, CD.; Edwards, CD.; Lushene, RE.; Montuori, J.; Platzek, D. *STAIC Preliminary Manual*. Palo Alto, CA: Consulting Psychologists Press; 1973.
27. Spielberger, CD.; Gorsuch, RL.; Lushene, RE. *STAI Manual for the State-Trait Anxiety Inventory ("Self-Evaluation Questionnaire")*. Palo Alto, CA: Consulting Psychologists Press; 1970.
28. Behrens JT. Principles and procedures of exploratory data analysis. *Psychological Methods*. 1977; 2(2):131–160.
29. Hankin BL, Abramson LY, Moffitt TE, Silva PA, McGee R, Angell KE. Development of depression from preadolescence to young adulthood: Emerging gender differences in a 10-year longitudinal study. *Journal of Abnormal Psychology*. 1998; 107(1):128–140. [PubMed: 9505045]

30. Twenge JM, Nolen-Hoeksema S. Age, gender, race, socioeconomic status, and birth cohort difference on the children's depression inventory: A meta-analysis. *Journal of Abnormal Psychology*. 2002; 111(4):578–588. [PubMed: 12428771]
31. Goldschmidt AB, Aspen VP, Sinton MM, Tanofsky-Kraff M, Wilfley DE. Disordered eating attitudes and behaviors in overweight youth. *Obesity*. 2008; 16(2):257–264. [PubMed: 18239631]
32. Goossens L, Braet C, Van Vlierberghe L, Mels S. Loss of control over eating in overweight youngsters: The role of anxiety, depression and emotional eating. *European Eating Disorders Review*. 2009; 17(1):68–78. [PubMed: 18729132]
33. Prentice AM, Jebb SA. Beyond body mass index. *Obesity Reviews*. 2001; 2(3):141–147. [PubMed: 12120099]
34. McKnight Investigators. Risk factors for the onset of eating disorders in adolescent girls: Results of the McKnight longitudinal risk factor study. *American Journal of Psychiatry*. 2003; 160(2):248–254. [PubMed: 12562570]
35. Killen JD, Taylor CB, Hayward C, Haydel KF, Wilson DM, Hammer L, et al. Weight concerns influence the development of eating disorders: A 4-year prospective study. *Journal of Consulting and Clinical Psychology*. 1996; 64(5):936–940. [PubMed: 8916622]
36. Stice E, Ng J, Shaw H. Risk factors and prodromal eating pathology. *Journal of Child Psychology and Psychiatry*. 2010; 51(4):518–525. [PubMed: 20074299]
37. Eddy KT, Dorer DJ, Franko DL, Tahirani K, Thompson-Brenner H, Herzog DB. Diagnostic crossover in anorexia nervosa and bulimia nervosa: Implications for DSM-V. *American Journal of Psychiatry*. 2008; 165(2):245–250. [PubMed: 18198267]
38. Stice E, Marti CN, Shaw H, Jaconis M. An 8-year longitudinal study of the natural history of threshold, subthreshold, and partial eating disorders from a community sample of adolescents. *Journal of Abnormal Psychology*. 2009; 118(3):587–597. [PubMed: 19685955]
39. Steinberg L. Cognitive and affective development in adolescence. *Trends in Cognitive Sciences*. 2005; 9(2):69–74. [PubMed: 15668099]
40. Striegel-Moore RH, Franko DL. Epidemiology of binge eating disorder. *International Journal of Eating Disorders*. 2003; 34(S1):S19–S29. [PubMed: 12900983]

Table 1

Adjusted Proposed Research Criteria for LOC-ED

A. Recurrent episodes of LOC eating. An episode of LOC eating is characterized by both of the following:	
1	A sense of lack of control over eating.
B. The LOC eating episodes are associated with three or more of the following:	
1	Eating in response to negative affect.
2	Secrecy regarding the episode.
3	Feelings of numbness (lack of awareness) while eating.
4	Eating more, or the perception of eating more, than others or food seeking in the absence of hunger or past satiation.
5	Negative affect following eating (e.g., shame/guilt).
C. The LOC eating episodes occur, on average, at least twice a month for three months.	
D. Eating is not associated with the regular use of inappropriate compensatory behaviors and does not occur exclusively during the course of anorexia nervosa, bulimia nervosa, or binge eating disorder.	

Modified from Eat Behav, 2008.¹⁸

Table 2

Demographic, anthropometric, and psychosocial characteristics by LOC status

Variable	NoLOC (n = 199)	SubLOC (n = 33)	LOC-ED (n = 19)	p- value	partial η^2
Age, years	10.20 $\pm$ 1.57	10.47 $\pm$ 1.32	10.90 $\pm$ 1.47	.12	--
Sex (%F)	50.25	66.67	68.42	.09	--
Race (% Non-White)	39.20	45.45	52.63	.45	--
Overweight (%)	45.73	69.70	100.00	<.001	--
Number LOC Eating Episodes in the last month ¹	--	1.85 $\pm$ 1.25	3.37 $\pm$ 1.54	.007	.14
Number of Objective Binge Episodes in the last month ¹	--	.52 $\pm$.74	1.00 $\pm$ 1.03	.17	.04
ChEDE					
Global ¹	.33 $\pm$.45 ^a	.88 $\pm$.67 ^b	1.33 $\pm$.62 ^c	<.001	.15
Restraint ¹	.29 $\pm$.50	.49 $\pm$.59	.93 $\pm$.63	.057	.02
Eating Concern ¹	.05 $\pm$.19 ^a	.42 $\pm$.51 ^b	.60 $\pm$.54 ^b	<.001	.19
Shape Concern ¹	.35 $\pm$.57 ^a	1.04 $\pm$.78 ^b	1.55 $\pm$.76 ^c	<.001	.15
Weight Concern ¹	.57 $\pm$.84 ^a	1.30 $\pm$ 1.05 ^b	2.12 $\pm$.99 ^c	<.001	.10
Depressive Symptoms ¹	5.49 $\pm$ 4.83 ^a	7.97 $\pm$ 4.87 ^b	5.11 $\pm$ 3.20 ^a	.03	.03
Anxiety Symptoms ¹	31.99 $\pm$ 7.00	35.03 $\pm$ 5.85	32.47 $\pm$ 5.48	.051	.02
BMI z-score ² (kg/m ²)	.83 $\pm$ 1.21 ^a	1.42 $\pm$ 1.06 ^{bc}	2.06 $\pm$.42 ^c	.002	.05
Adiposity ³ (kg)	14.99 $\pm$ 11.90 ^a	20.71 $\pm$ 12.37 ^b	27.72 $\pm$ 8.86 ^c	.01	.04

¹ Analyses controlled for BMI z-score and race,² Analysis controlled for race,³ Analysis controlled for age, sex, race, and height (cm).

Note: ChEDE scores range 0–6; CDI scores range 0–54, STAI-C scores range 20–80

Significant between-group differences ($p < .05$) in pairwise comparisons are denoted by different superscripts.