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History of Weight Control Attempts Among Adolescent Girls with Loss of Control Eating

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Abstract

Objective—Loss of control (LOC) eating and a weight control attempt (WCA) history during adolescence are important behavioral risk factors for eating disorders and obesity. The current study investigated the significance of the presence of a WCA history among adolescent girls with LOC eating.

Methods—Participants were 114 obesity prevention-seeking 12–17-year-old (M=14.5, SD=1.7 years) girls who were between the 75th and 97th body mass index (BMI) percentile (BMI-z: M=1.5, SD=0.3) and reported LOC eating episodes during the previous month (M=4.0, SD=4.9 episodes; Median=2.0). Measures included the Eating Disorder Examination to assess LOC eating, eating pathology, and WCA history, and self-report questionnaires for symptoms of general psychopathology. Eating behavior was observed during a laboratory meal designed to capture a LOC eating episode.

Results—67.5% reported a WCA history. As compared to girls without a WCA history (no-WCA), those with a WCA history (WCA) had greater disordered eating attitudes and depressive symptoms (*ps*<.04). There were no significant group differences in BMI-z or LOC eating (*ps*>.10).

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During the laboratory meal, WCA consumed less energy from snack-type foods than no-WCA (M=245.0, SD=156.1 vs. M=341.6, SD=192.3 kcal; *p*=.01).

Conclusions—Reported WCAs are highly prevalent and are associated with greater psychopathology symptoms among adolescent girls with LOC eating. Prospective data are needed to determine whether these overlapping risk behaviors confer differential vulnerability for developing eating disorders and obesity.

Keywords

Loss of control eating; dieting; weight control behavior; eating disorders; obesity

The prevalence of adolescent binge eating-type disorders, such as bulimia nervosa and binge eating disorder (BED) (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011) and obesity (Ogden, Carroll, Kit, & Flegal, 2012) are substantial. Current and past reports of loss of control (LOC) eating and weight control attempts (WCA) in youths are two important and robust risk factors for binge eating-type disorders (Stice, Marti, & Durant, 2011; Tanofsky-Kraff et al., 2011) and obesity (e.g., Field et al., 2012). LOC eating is characterized by the subjective experience of being unable to control what or how much one is eating (Tanofsky-Kraff, Yanovski, & Yanovski, 2011). WCAs—often referred to as dieting—are intentional changes in eating behavior for the purpose of maintaining or losing weight, regardless of effectiveness (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008). Between 25 to 50% of adolescents report LOC eating or WCAs (Haines & Neumark-Sztainer, 2006).

Approximately 50 to 85% of youth with LOC eating also report a history of WCAs (Neumark-Sztainer et al., 2007; Tanofsky-Kraff, Faden, Yanovski, Wilfley, & Yanovski, 2005). Several theories have proposed that WCAs and LOC eating may be causally linked. Restraint theory proposes that the rigid cognitive control imposed as a result of strict WCAs increases vulnerability for binge eating when it is believed that the dietary rules have been violated (Polivy & Herman, 1985). Although modest dietary restraint has not been shown to promote the development of eating disorders in adult studies (National Task Force on the Prevention and Treatment of Obesity, 2000), self-reported WCAs in youth—which can often include moderate restraint over eating—may be a marker for disordered eating and psychological problems (Haines & Neumark-Sztainer, 2006). Indeed, the dual factor model of hunger posits that even moderate WCAs lead to LOC eating and psychological distress by inducing the perception of energy deprivation in genetically susceptible individuals with a heightened appetitive responsiveness to environmental food cues (Lowe & Levine, 2005). There is preliminary support for these theories in overweight children with LOC eating, in that WCAs occurred earlier on average than the onset of LOC eating (Claus, Braet, & Decaluwe, 2006) and elevated eating pathology was found among children reporting the onset of WCAs prior to LOC (Tanofsky-Kraff, et al., 2005). Yet, the temporal sequence of reported WCA and LOC eating has not been well-studied in adolescents.

The current study investigated WCA history in adolescent girls with LOC eating. We hypothesized that girls with LOC who also reported prior WCAs would have greater eating disorder and emotional distress than those with no history of WCAs. Given restraint theory and prior data in middle childhood, we expected that adolescents reporting WCAs first

would have greater disordered eating attitudes as compared to those reporting LOC first. Based on the dual factor model, we also expected that girls who had WCAs would be more prone to overconsumption of palatable foods in the laboratory.

Methods

Participants and Procedures

Participants were adolescent girls (age 12–17 years) enrolled in a randomized controlled trial examining the efficacy of an excess weight gain prevention program (Clinicaltrials.gov ID: NCT00263536). Girls were considered at-risk for excess weight gain (Field, Cook, & Gillman, 2005; Tanofsky-Kraff, Yanovski, et al., 2009) and BED (Tanofsky-Kraff, Shomaker, et al., 2011) by virtue of having a BMI between the 75th to 97th percentile for age and sex (Ogden et al., 2002) and reporting the presence of at least one LOC eating episode in the past month. Exclusion criteria involved a current medical or psychiatric condition (other than BED), treatment impacting body weight, or psychotherapy. Interested families provided informed written parental consent and child assent during an initial screening when psychological measures were completed. Eligible girls participated in a second visit during which fasting anthropometric measures were taken and a laboratory meal was completed.

Screening Visit 1

The Eating Disorder Examination (EDE; Fairburn & Cooper, 1993) was used to determine the presence or absence of LOC eating in the past month. The EDE generates four subscales, including restraint, eating concern, shape concern, and weight concern, which average to create a global score. The EDE has excellent psychometric properties in adolescents (Glasofer et al., 2007). Cronbach's alphas for the global score and subscales ranged from 0.86–0.94. Age of Onset interview questions (Tanofsky-Kraff, et al., 2005) were included as an adjunct to the EDE to obtain retrospective reports of girls' WCA history, including the nature of the first WCA, number of WCAs, the ages of onset, and the temporal sequence of WCA and LOC onset. The Age of Onset questions have demonstrated convergent validity in children (Tanofsky-Kraff, et al., 2005) and construct validity with intake for our current sample (p=.003). The Beck Depression Inventory, Second version (Beck, Steer, & Brown, 1996) assessed depressive symptoms and has demonstrated excellent psychometric properties in adolescents (Ambrosini, Metz, Bianchi, Rabinovich, & Undie, 1991); Cronbach's alpha was 0.85.

Screening Visit 2

Fasting weight (kg) and height (cm) was measured using calibrated electronic instruments. BMI standard deviation (BMI-z) and BMI percentile scores for age and sex were calculated (Ogden, et al., 2002). Body fat and lean mass (kg) were measured by dual-energy x-ray absorptiometry (DXA) using Hologic QDR 4500A equipment (Hologic Inc., Bedford, MD). Intake During the Laboratory Meal. At 11 am, girls were asked to consume their lunch ad libitum from a buffet meal designed to model a LOC eating episode as previously described (Tanofsky-Kraff, McDuffie, et al., 2009). This paradigm is a standard, well-validated approach in pediatric and adult samples (Tanofsky-Kraff, McDuffie, et al., 2009; Walsh &

Boudreau, 2003), and its effects appear to be particularly robust in overweight females (Geliebter, Hassid, & Hashim, 2001; Tanofsky-Kraff, McDuffie, et al., 2009).

Analytic Plan

Analyses were conducted with SPSS version 19.0 (SPSS, Inc., Chicago, IL). Data were screened for normality. Logarithmic transformations were made for total energy intake and arcsine transformations were made for the percentage of macronutrient content intake. Outliers were adjusted to fall 1.5 times the interquartile range below or above the 25th or 75th percentile. Independent samples t-tests were used to compare girls with and without a WCA history. ANCOVAs were used to compare WCAs and no-WCAs with regard to laboratory eating behavior. Covariates included age, race, lean mass (kg), percent fat mass, height (cm), and total intake (for analyses examining macronutrient intake only). Among WCAs only, the same set of analyses to compare WCA First and LOC First groups. Differences were considered significant when they were under the alpha value threshold set by the Bonferonni-Hochberg correction applied to adjust for multiple comparisons. All tests were two-tailed.

Results

Participants were 114 adolescent girls between 12 and 17 years (age: M=14.5, SD=1.7 years). The racial/ethnic breakdown of the sample was 54.4% non-Hispanic White, 24.6% non-Hispanic Black/ African American, 6.1% Hispanic/ Latino, 2.6% Asian, 7.9% Multi-Racial, and 4.4% Other. Girls reported a mean of 4.0 (SD=4.9) LOC episodes in the previous month (Median=2.0).

Sixty-seven percent (*n*=77) of girls reported a life history of at least one WCA. These girls reported a mean age of WCA onset of 11.9 (SD=1.9) years. and 54.5% reported modifying intake only, 14.3% modifying intake and physical activity, 18.2% adherence to a structured diet plan, and 13.0% unhealthy dieting practices. Lifetime WCAs ranged from 1–8 (M=2.3, SD=2.5; Median=3.0). Number of lifetime WCAs was positively correlated with BMI-z, subjective binge episode frequency, EDE shape and weight concern, and EDE global scale (ps=0.27–0.37, *p*s≤.02). There was an inverse correlation between number of WCAs and objective binge episodes (p=−0.27, *p*=.02). The first WCA ranged from 1–120 days (M=29, SD=35; Median=14), which was positively correlated with EDE shape and weight concern and EDE global scale (ps=0.24–0.32, *p*s≤.03).

See Table 1 for WCA and no-WCA on dependent variables. At the test meal, WCA consumed less energy from snack-type foods (M=245.0, SD=156.1 vs. M=341.6, SD=192.3 kcal) and from condiments (M=112.7, SD=100.4 vs. M=169.4, SD=153.9 kcal) than no-WCA (*p*s≤.02). No differences were identified with regard to overall intake, percent macronutrient consumed, or any other food type intake (*p*s≥.10). Among WCAs only, 46.8% (n=36) reported WCA onset prior to LOC eating. The WCA First group reported more lifetime WCAs (M=3.9, SD=2.6 vs. M=2.8, SD= 2.0) and were more likely to be currently dieting (22.2% vs. 4.9%) than LOC First (*p*s≤.04). Most girls in both the WCA First and LOC First groups reported the onset of overweight prior to making a WCA (91.7% vs. 87.8%, *p*=.72). Yet, WCA First was more likely to report becoming overweight prior to

LOC onset than LOC First (75.0% vs. 36.6%; *p*=.001). At the test meal, WCA First consumed fewer calories from snack-type foods than LOC First (M=218.0, SD=133.5 vs. M=292.0, SD= 173.0 kcal; *p*=.02).

Discussion

The current study examined the co-occurrence among two shared risk factors for binge eating-type disorders and obesity in a sample of intervention-seeking adolescent girls at high-risk for excess weight gain and BED. Overall, girls with a reported history of WCA differed on psychological characteristics and observed eating as compared to those with no WCA history.

A substantial percentage of girls with LOC eating reported a WCA history. One third of girls reported that WCA onset preceded LOC eating onset, which parallels studies in children (Tanofsky-Kraff, et al., 2005) and adults (Grilo & Masheb, 2000; Reas & Grilo, 2007). Although most girls with a WCA history reported healthful behavioral changes, a larger proportion of adolescents (13%) reported the use of unhealthy WCA strategies than a younger sample in which there were no reports of such behaviors (Tanofsky-Kraff, et al., 2005). Girls reporting the onset of WCAs before LOC were more likely to report the use of unhealthy WCAs, indicating that this subset could potentially be at higher risk for regularly adopting inappropriate WCA behaviors. This hypothesis is consistent with data indicating that the vast majority of adult women with bulimia nervosa report the onset of WCAs prior to binge eating (Mussell et al., 1997). Among girls with a WCA history, the number of WCAs was positively related to adiposity, over-concern with shape and weight, and depressive symptoms. These findings confirm the need to assess for and intervene with WCA behaviors in youths reporting LOC eating, especially those who report making WCA attempts before they experienced LOC and those with numerous prior WCAs.

Consistent with results in obese adults with BED (Roehrig, Masheb, White, & Grilo, 2009), girls with a WCA history reported higher disordered eating attitudes, and depressive symptoms than those who have never made a WCA. The severity of eating pathology in WCAs was comparable to ratings in adolescents with BED (Glasofer, et al., 2007). Notably, girls with a WCA history have at least four concurrent risk factors for eating disorders and obesity—WCA history, LOC eating, depressive symptoms, and body dissatisfaction (Haines & Neumark-Sztainer, 2006; Stice, 2002)—that may place this subgroup at particularly high-risk for BED. These findings support the dual factor model of hunger (Lowe & Levine, 2005), and to some extent restraint theory (Polivy & Herman, 1985), as girls reporting primarily moderate but also unhealthy WCAs had clinically meaningful levels of psychological distress.

Conversely, findings suggest that a WCA history and the onset of WCAs before LOC are associated with laboratory consumption of fewer snack-type foods. This is in contrast to our hypothesis based upon the dual factor model of hunger (Lowe & Levine, 2005), which posits that WCAs would be more vulnerable to consuming palatable foods that are readily accessible. Since girls with no WCA history exhibited an eating pattern that appeared more indicative of a LOC episode, these findings could be viewed as potentially supporting

alternative models of LOC eating that do not expressly involve dietary restraint. If girls with a WCA history sustain their laboratory eating patterns, a more healthful obesity-related outcome, as observed in adults with BED who report a history of frequent WCAs (Roehrig, et al., 2009), may ensue. Although there are longitudinal adult data showing that any WCA is associated with lower mortality (Gregg, Gerzoff, Thompson, & Williamson, 2003), the presence of even modest WCAs may come with a steep psychological cost for youth with LOC eating, especially if they initiate prior to the development of LOC eating patterns.

Strengths of the current study include the use of interviews, a racially/ethnically diverse sample, and the use of an objective measure of eating behavior. Although girls ate alone and were unobserved during the test meal, it is possible that their eating behavior was impacted by social desirability biases. Potential limitations include the homogeneity of the sample and the exclusion criterion for current psychiatric comorbidity. The reliance on retrospective recall to assess WCA history and temporal sequence onset can introduce measurement error and may be subject to biases. Yet the semi-structured interview format likely enhanced recall (Brewin, Andrews, & Gotlib, 1993) and the events recalled occurred were within the past 2–3 years for the vast majority of girls, which is within a timeframe that has been shown to be easier to remember accurately (Bradburn, Rips, & Shevell, 1987).

In conclusion, a WCA history is a common and clinically relevant behavior among adolescent girls with LOC eating. Although most with WCAs reported moderate behaviors and exhibited laboratory eating that could promote more healthful obesity-related outcomes, the presence of a WCA history was associated with emotional distress. Findings suggest that the temporal sequence of WCA and LOC onset, the number of prior WCAs, and the length of youths' first WCA are related to the severity of clinical correlates. Prospective studies are required to replicate these retrospective report findings and to investigate the predictive validity of the co-occurrence and temporal sequence of WCAs and LOC eating so that more tailored interventions can be developed.

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Table 1

Comparison of Girls with and without a Reported History of Weight Control Attempts (WCAs).

	WCA History (n = 77)	No WCA History (n = 37)			
Variable	**M (SD)**	**M (SD)**	**Test Statistic**	***p* value**	**Effect Size[a]**
Age (years)	14.70 (1.70)	13.98 (1.53)	t(108) = −2.13	.04	0.45
LOC Onset (years)	11.44 (2.13)	10.92 (2.23)	t(112) = −1.21	.23	0.24
OW Onset (years)	10.68 (2.23)	10.64 (2.34)	t(112) = −0.08	.94	0.02
BMI-z	1.53 (0.35)	1.53 (0.33)	t(109) = −0.10	.92	0.00
LOC Frequency	3.82 (4.44)	4.29 (5.71)	t(112) = 0.49	.63	−0.09
EDE Global Score	2.28 (0.94)	1.82 (1.05)	t(112) = −2.34	.02	1.01
EDE Restraint	1.59 (1.05)	1.10 (1.08)	r(112) = −2.33	.02	0.46
EDE Eating Concern	1.50 (1.08)	1.25 (1.00)	t(112) = −1.21	.23	0.24
EDE Shape Concern	3.14 (1.23)	2.50 (1.44)	t(112) = −2.42	.02	0.48
EDE Weight Concern	2.85 (1.17)	2.36 (1.34)	t(112) = −1.98	.05	0.39
Depressive Symptoms	11.41 (6.34)	8.33 (5.93)	t(111) = −2.46	.02	0.50
	% (n)	% (n)			
Race (% White)	55.8 (43)	51.4 (19)	χ^2 (1, n = 114) = 0.20	.65	.04

Note: OW = overweight; EDE = Eating Disorder Examination; LOC Frequency = Number of loss of control eating episodes in the month prior to assessment.

[a]Effect sizes for independent samples t-tests are Cohen's D; effect sizes for chi-square tests are φ.