Published in final edited form as:

Eat Behav. 2011 January ; 12(1): 15–20. doi:10.1016/j.eatbeh.2010.09.001.

Self-reported versus Actual Energy Intake in Youth with and without Loss of Control Eating

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Abstract

Episodes of loss of control over eating (LOC) in children and adolescents —often characterized by the consumption of highly palatable dessert and snack-type foods—have been associated with a lack of awareness while eating that could lead to under- or over-estimation of how much food is consumed. However, little is known about the reporting accuracy of food intake in youth with and without LOC eating. One-hundred-fifty-six girls and boys were administered the Eating Disorder Examination to assess for the presence of LOC eating. Youth were queried regarding the amounts of foods consumed directly following a multi-item, laboratory buffet test meal. Children with LOC (n=42) did not differ significantly from youth without LOC (n=114) in reporting accuracy of total food intake (reported minus actual energy intake: 153.0 ± 59.6 v. 96.9 ± 36.0 kcal; $p=0.42$). However, compared to those without LOC, children with LOC were less accurate at reporting percentage of energy intake from carbohydrate ($p=0.01$). Youth with LOC were also less accurate at reporting their intake of desserts ($p=0.04$). Findings point to the possibility that youth with LOC may have poorer recall of sweet food consumption. Future research is required to examine whether poorer recall reflects a lack of awareness while eating palatable, sweet foods.

Keywords

Child; Adolescent; Binge Eating; Loss of Control Eating; Reporting Accuracy; Obesity

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1. Introduction

Loss of control (LOC) eating—the subjective experience of a lack of control while eating any amount of food—is one of the most prevalent disordered eating patterns among youth (Tanofsky-Kraff, 2008). LOC eating is reported by 2–10% of children and adolescents among community samples (Field, et al., 1999; Lamerz, et al., 2005; Maloney, McGuire, Daniels, & Specker, 1989). Compared to youth without LOC eating, those who report LOC eating episodes have higher body fat mass and a greater likelihood of being overweight (Morgan, et al., 2002; Tanofsky-Kraff, et al., 2004). Furthermore, reported LOC is predictive of excessive weight gain over time (Tanofsky-Kraff, Yanovski, et al., 2009).

Although the mechanisms by which LOC eating lead to excess adiposity are not fully understood, it is quite likely that youth who report LOC exhibit specific eating patterns that predispose them to a positive energy balance. Questionnaire reports (Theim, et al., 2007) and observational data from a laboratory feeding study (Tanofsky-Kraff, McDuffie, et al., 2009) suggest that youth who report LOC can be differentiated from those without LOC by the consumption of greater percentage energy intake from carbohydrate and less from protein, largely due to greater energy intake of dessert and snack-type foods. These patterns are somewhat consistent with descriptions of adult binge eating episodes, which are characterized frequently by consumption of foods high in sugar and fat (Guertin & Conger, 1999; Hadigan, Kissileff, & Walsh, 1989; Yanovski, 2003).

Intake of palatable foods may serve to alleviate negative affective states via their physiological activation of the opioid and dopaminergic pleasure and reward systems (Gosnell & Levine, 2009). From an Escape Theory perspective, individuals prone to LOC eating episodes may consume palatable foods in an attempt to relieve emotional distress (Heatherton & Baumeister, 1991). Indeed, children who report LOC eating endorse more frequent eating in response to negative emotions than youth without LOC (A. Hilbert & Tuschen-Caffier, 2007; Tanofsky-Kraff, et al., 2007). In theory, consumption of highly palatable foods in an attempt to cope with negative affective states may foster a lack awareness of what or how much is being eaten (Heatherton & Baumeister, 1991). Consistent with this notion are empirical data from a large, multi-site study of pediatric LOC eating (Tanofsky-Kraff, et al., 2007). Children with LOC often described a sense of “numbing out” while eating, using terms such as “numb out,” “zone out,” “blank out,” “paralyzed,” or “stunned” during LOC episodes (Tanofsky-Kraff, et al., 2007). These findings suggest that youth with LOC eating could have less awareness of the types or amounts of food they consume compared to those with no LOC. Research investigating misreporting and eating behavior/disordered eating cognitions appears to be limited to the adult literature, with findings indicating greater misreporting among adults with restrained eating, high body dissatisfaction (Novotny, et al., 2003; Scagliusi, Polacow, Artioli, Benatti, & Lancha, 2003), disinhibited eating (Asbeck, et al., 2002), and a desire for weight change (Johansson, Solvoll, Bjorneboe, & Drevon, 1998). However, to our knowledge, no study to date has examined the food intake reporting accuracy of children with and without LOC.

The objective of the current study was to investigate the reporting accuracy for consumption of foods frequently reported as being preferentially consumed during LOC or binge episodes (i.e., dessert and snack foods) among children with reported LOC eating compared to children without LOC. We used a lunchtime multiple-item laboratory food buffet (Tanofsky-Kraff, McDuffie, et al., 2009) to assess actual energy intake from a large sample of children and adolescents with and without LOC. Based on the premise that LOC eating may be associated with a sense of emotional numbing (Tanofsky-Kraff, et al., 2007) and data indicating that children with LOC are more likely to consume snack-type and carbohydrate-laden foods (A. Hilbert, Tuschen-Caffier, & Czaja; Tanofsky-Kraff, McDuffie,

et al., 2009; Theim, et al., 2007), we hypothesized that youth with LOC would be less accurate at reporting percentage of calories consumed from carbohydrate and their intake of palatable foods (i.e. dessert and snack foods) compared to their non-LOC counterparts, even after controlling for body composition. Because past research has shown a tendency for heavier youth to under-report food intake as assessed by dietary recall or records (Bandini, Schoeller, Cyr, & Dietz, 1990; Fisher, Johnson, Lindquist, Birch, & Goran, 2000; Lancetot, Klesges, Stockton, & Klesges, 2008; Ventura, Loken, Mitchell, Smiciklas-Wright, & Birch, 2006; Waling & Larsson, 2009), we also hypothesized that there would be a relationship between percentage body fat and poorer reporting accuracy of observed food intake at a laboratory test meal.

2. Methods

2.1. Participants

Participants were a subset drawn from a larger study of healthy volunteers participating in a study of eating behaviors in children (NCT00320177) (Tanofsky-Kraff, McDuffie, et al., 2009). Youth were recruited through flyers posted on bulletin boards at the National Institutes of Health (NIH) as well as at local area supermarkets, libraries, and listservs in the Washington, DC greater metropolitan area. The study was advertised as a non-treatment investigation of the eating behaviors of youth between the ages of 8 and 17 years. As detailed previously (Tanofsky-Kraff, McDuffie, et al., 2009), exclusionary criteria included the presence of a significant medical condition or psychiatric condition, weight loss of greater than 5 lbs (2.3 kg) in the three months prior, participation in weight loss treatment, and the use of medication known to affect body weight. Written assent and consent were obtained from youth and their parents, respectively. All study procedures were approved by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Institutional Review Board.

2.2. Procedure

Data for the current project were collected from participants' visits to the NIH Hatfield Clinical Research Center at three separate outpatient appointments. The first visit was a screening appointment to determine study eligibility and to assess LOC eating. The second and third visits involved a laboratory test meal to measure actual food intake and accuracy of reporting intake. Participants were instructed to adhere to an overnight fast (only water allowed) initiated at 10:00 pm the night before each appointment.

2.3. Measures

2.3.1. Body composition—At the screening appointment, height and fasting weight were measured with calibrated electronic instruments, as described previously (Russell, Keil, & Bonat, 2001). Body mass index (BMI; kg/m^2) was calculated as weight (in kg) divided by the square of height (in m). The Centers for Disease Control and Prevention 2000 growth charts were used to calculate BMI-*z* scores (Kuczmarski, Ogden, & Guo, 2002). Fat-free mass (kg) and fat mass as a percentage of total mass were measured using air displacement plethysmography (Bod Pod; Life Measurement Inc, Concord, CA). Body composition measurements (including weight) were obtained with clothes and shoes removed while participants were in a fasted state.

2.3.2. LOC eating—Presence or absence of LOC eating was determined based upon child responses to the Eating Disorder Examination (EDE), version 12.0D/C.2 (Fairburn & Cooper, 1993), or the EDE adapted for children <14 years of age (Bryant-Waugh, Cooper, Taylor, & Lask, 1996) as described previously (Tanofsky-Kraff, et al., 2004). Participants were queried by trained interviewers about any episodes of overeating in the month prior to

assessment. Youth were categorized as those with LOC if they reported any experience of lack of control over eating in the past month, regardless of whether LOC was accompanied by an unambiguously large reported amount of food (i.e., an objective binge episode) or a reported amount not viewed as excessively large by the interviewer, but viewed as overeating by the interviewee (i.e., a subjective binge episode). Youth who reported objective overeating without LOC or no episodes of overeating were categorized as not having LOC. Excellent psychometric properties have been demonstrated for the EDE in an adolescent sample (Glasofer, et al., 2007) and for the EDE adapted for children in 6- to 13-year-olds (Tanofsky-Kraff, et al., 2004).

2.3.3. Actual food intake—As previously described (Tanofsky-Kraff, McDuffie, et al., 2009), following an overnight fast and standardized breakfast, participants were invited to eat from a 9,835 kcal multiple-item buffet test meal on two separate days. The buffet test meal represented an array of macronutrients (12% protein, 51% carbohydrate, and 37% fat across all foods) and was comprised of a large variety of foods that most children like. Items at the test meal represented nine food groups. Desserts on the array included sandwich cookies, wafer cookies, chocolate candy, and jellybeans and salty snacks were tortilla chips and pretzels. When youth entered the test meal room, they were played one of two randomly assigned tape recorded meal instructions “Eat as much as you would at a normal meal” (the “normal meal” instruction) or “Let yourself go and eat as much as you want” (the “binge meal” instruction). Actual amounts of foods and beverages consumed were measured by calculating the differences in weight (g) of each food item before and after the meal. Energy content (kcal) and macronutrient composition (percentage carbohydrate, fat, and protein) for each food were determined with data from the U.S. Department of Agriculture (USDA) National Nutrient Database for Standard Reference (USDA Agricultural Research Service, Beltsville, MD), as well as food manufacturer nutrient information obtained from food labels.

2.3.4. Reported food intake—Immediately following completion of the test meal, youth were interviewed regarding which food and caloric beverage items they selected and the amounts they consumed. Although for the larger study (Tanofsky-Kraff, McDuffie, et al., 2009), children participated in two separate test meals on separate days, they were only interviewed regarding their perceived food intake after the second meal to avoid priming responses. Specifically, the researcher listed each item on the buffet array, and asked children whether or not they consumed the item. For those items reported as eaten, participants were queried about the amount consumed with the aid of a book of photographed food portions (Hess, 1997). Reported amounts were converted from grams (g) into calories (kcal) and corresponding macronutrient composition percentages, using the same nutrient data from the USDA National Nutrient Database for Standard Reference and food manufacturers described above, in order to compare reported intake to actual intake.

2.3.5 Perceived loss of control (LOC) during test meal—Following the meal, youth were asked to rate the extent to which the meal felt typical of a LOC eating episode. Items were rated on a 5-point Likert scale, with answers ranging from “Not at all” (score of 1) through “Extremely” (score of 5). Youth also could select “Not applicable” if they reported that they have never experienced LOC over eating. For the purposes of this study, items were recoded to be considered categorically. A score of 0 was assigned if youth chose “Not applicable” or indicated that the meal felt “Not at all” like a typical LOC eating episode. A score of 1 was designated for all other responses.

2.4. Statistical analyses

All analyses were performed with SPSS 16.0 (SPSS Inc., 2007). The dependent variables were reporting accuracy defined in two ways. First, the *directional difference* in reporting accuracy of percentage macronutrient (carbohydrate, fat, and protein) intakes were calculated as the reported percentage consumed less the actual percentage consumed. The directional differences in reporting accuracy of total energy intake (kcal), salty snack intake (kcal), and dessert intake (kcal) were calculated as the reported amount consumed (kcal) less the actual amount consumed (kcal). Negative directional difference scores were thus indicative of under-reporting and positive scores were indicative of over-reporting of food intake. Second, the *absolute difference* in reporting accuracy of percentage intake from macronutrients (carbohydrate, fat, and protein) was calculated as the absolute value of the difference between the reported percentage consumed and the actual percentage consumed. Likewise, the absolute difference in reporting accuracy of total energy, and salty snack and dessert intakes was the absolute value of the difference between the reported amount consumed (kcal) and the actual amount consumed (kcal). Higher values of absolute difference scores, thus, signified greater reporting inaccuracy overall, regardless of under- or over-reporting. Pearson correlations were conducted to examine the magnitude of the correspondence between reported intake and actual intake for total energy, salty snack, and dessert intakes. A series of analyses of covariance (ANCOVAs) was conducted to test differences in reporting accuracy based on LOC eating status. The dependent variables were directional and absolute difference scores for total intake, percentage intakes from carbohydrate, fat, and protein, salty snack intake, and dessert intake. In each ANCOVA model, LOC eating (presence vs. absence of ≥ 1 episode in the month prior to assessment) was the independent variable. For all models, covariates included percentage body fat, fat-free mass (kg), height (cm), meal instruction ("Eat as much as you would at a normal meal" vs. "Let yourself go and eat as much as you want"), age (y), and race (non-Hispanic, White vs. Other). Sex (male vs. female) was considered, but it was removed because it did not significantly contribute to any model. To be conservative, actual percentages of macronutrients consumed were included in the respective models predicting reporting accuracy of percentage macronutrients. Likewise, total intake (kcal) consumed was included as a covariate in models predicting reporting accuracy of total energy, salty snack, and dessert intakes because Bland-Altman comparisons (Bland, 1986) revealed that actual total intake was significantly related to directional and absolute difference scores, such that the more total energy actually consumed, the poorer the reporting accuracy.

3. Results

3.1. Descriptive demographic characteristics of sample

Participants were 156 children and adolescents ranging from 8 to 17 years of age ($M \pm SD$, 12.9 ± 2.8 y). The sample was comprised of approximately equal numbers of females (49.4%) and males and was 63.5% White, Non-Hispanic. The mean BMI of the sample was 24.1 ± 9.0 kg/m² (Range=13.4 to 69.0 kg/m²), and correspondingly, the mean BMI-z score was 0.9 ± 1.2 (Range=0.2 to 3.2).

3.2. Descriptive information on reporting accuracy of food intake

Actual total energy intake consumed at the test meal ranged from 350.5 to 2,983.9 kcal ($M \pm SD$, $1,431.0 \pm 596.0$ kcal), and reported total energy intake ranged from 513.6 to 3,185.9 kcal ($1,544.6 \pm 572.6$ kcal). On average, youth over-reported total energy intake by 113.5 ± 416.8 kcal (Range_{total intake, directional difference} = $-1,157.6$ to $+1,657.1$ kcal). Additionally, mean reporting inaccuracy overall (absolute value of either under- or over-reporting) for total energy intake was 324.2 ± 284.6 kcal (Range_{total intake, absolute difference} = 5.7 to $1,657.1$ kcal).

Actual total energy intake was correlated with reported total intake, $r=0.75$, $p<0.01$. Actual percentage carbohydrate, fat, and protein intakes were correlated with reported percentage intakes of carbohydrate ($r=0.72$), fat ($r=0.66$), and protein ($r=0.79$), $p_s<0.01$. Also, actual salty snack intake and dessert intake were correlated with reported salty snack ($r=0.72$) and dessert intakes ($r=0.77$), $p_s<0.01$.

Percentage body fat was significantly associated with the directional discrepancy between actual and reported total intake ($r=-0.30$, $p<0.01$; Figure 1), meaning that the higher percentage of adiposity, the greater the extent to which youth under-reported their total energy intake. Likewise, percentage body fat was inversely related to directional differences in percentage of carbohydrate ($r=-0.27$, $p<0.01$), fat ($r=-0.27$, $p<0.01$), and protein ($r=-0.19$, $p<0.05$), as well as salty snack intake ($r=-0.19$, $p<0.05$) and dessert intake ($r=-0.23$, $p<0.01$), such that higher body fat was associated with under-reporting of these variables. Percentage body fat was not associated with the absolute differences in these variables.

3.3. LOC eating and reporting accuracy

Forty-two youth (26.9%) endorsed at least one LOC episode in the month prior to assessment. Number of episodes ranged from 1 to 15, although most participants with LOC eating reported few episodes ($M\pm SD=3.5\pm 3.5$ episodes). As reported previously (Tanofsky-Kraff, McDuffie, et al., 2009), compared to youth without LOC, children reporting LOC had greater percentage body fat ($M\pm SD=24.5\pm 13.0\%$ vs. $32.1\pm 11.4\%$; $p<0.01$) and BMI-z scores ($M\pm SD=0.7\pm 1.2$ vs. 1.2 ± 1.0 ; $p=0.02$) and were more likely to be female (42% vs. 69%; $\chi^2=8.91$, $p<0.01$). LOC eating presence was related to the perceived experience of LOC during the laboratory test meal; specifically, a greater percentage of youth who endorsed LOC on the EDE endorsed LOC during the test meal (64.3%) compared to youth who did not endorse LOC on the EDE (28.9%; $\chi^2=16.19$, $p<0.001$).

Total energy intake, percentage macronutrient intake, salty snack intake, and dessert intake reporting accuracies based upon LOC status are presented in Table 1. LOC presence was not significantly associated with either the directional or absolute difference scores for total intake. However, LOC presence was related to the absolute difference in the reporting accuracy of percentage of carbohydrate consumed, such that youth with LOC were less accurate overall (either under- or over-reporting) in estimating overall percentage of calories from carbohydrate as compared to youth without LOC ($p=0.01$; Figure 2).

Youth with LOC eating also were significantly less accurate overall at reporting their dessert intake compared to those without LOC ($p=0.04$; Figure 2). Follow-up analyses accounting for the amount of desserts actually consumed rather than total energy intake consumed indicated that the association between LOC presence and desserts, absolute difference score was no longer significantly different after controlling for actual dessert intake ($p=0.14$).

We also conducted a series of secondary analyses to examine potential differences associated with meal instruction. Findings did not differ when analyzing binge and normal meal instructions separately.

4. Discussion

The current study investigated the reporting accuracy of LOC or binge-type foods (i.e., desserts and snacks) among children with and without loss of control (LOC) eating. Whereas reporting accuracy of total energy intake was not associated with LOC status, youth reporting LOC were less accurate than those without LOC at describing their percentage of intake from carbohydrate and dessert intake.

Consistent with prior literature (Bandini, et al., 1990; Fisher, et al., 2000; Lanctot, et al., 2008; Ventura, et al., 2006; Waling & Larsson, 2009), findings from the current study confirmed that adiposity was robustly associated with under-reporting of total energy intake. As has been suggested previously, possible explanations for under-reporting among heavier youth include social desirability biases, insufficient awareness of how much energy is consumed, or minimization of intake due to guilt about eating (Fisher, et al., 2000; Herbert, Ma, & Clemow, 1997; Livingstone, et al., 1992). Misreporting of energy intake is a significant problem in dietary assessment, with unique challenges arising in the measurement of children's energy intake (Livingstone & Robson, 2000). Given the current high rates of pediatric obesity (Ogden, Carroll, Curtin, Lamb, & Flegal), inaccurate report of food intake may complicate weight management recommendations. Our findings bolster prior literature suggesting that relying upon dietary recall methods, especially among heavier youth or those with reported LOC eating patterns, may provide spurious data.

The observed associations between LOC and reporting inaccuracy for percentage carbohydrate consumption and desserts were found after accounting for the significant contribution of body composition. That youth with LOC were more unaware of their dessert consumption—both under- and over-reporting—supports the possibility that highly palatable dessert foods may be associated with “numbing” in youth with LOC. Thus, children with LOC may be less aware of what, or how much, they are eating as opposed to consciously underestimating the amount consumed. Although this effect persisted even after adjusting for differences in total energy intake, in the most conservative analyses accounting for the actual amount of dessert intake, the effect was attenuated. This pattern suggests that the association between LOC eating and poorer recall of dessert intake may be in large part accounted for by the fact that youth with LOC consumed more desserts than youth without LOC (Tanofsky-Kraff, McDuffie, et al., 2009; Theim, et al., 2007). Nevertheless, we also found that children with LOC were less accurate in estimating their percentage intake of carbohydrates compared to youth without LOC, controlling for body composition as well as actual percentage carbohydrate intake and other relevant covariates. It is plausible that youth with LOC may be prone to inaccurate estimation of “comfort foods” consumed, because most of the carbohydrate-dense foods on the test meal array were highly palatable (Tanofsky-Kraff, Yanovski, et al., 2009).

Unawareness of amounts of carbohydrate-dense or comfort food consumed among youth with LOC would be consistent with Escape Theory, which suggests that binge eating results from an attempt to escape from state affective distress (Heatherton & Baumeister, 1991). Strategies to escape from negative emotional states are thought to predispose individuals toward ignoring feedback, including physiological satiety signals that typically inhibit overeating (Everill & Waller, 1995; Fuller-Tyszkiewicz & Mussap, 2008; Heatherton & Baumeister, 1991). Research investigating alexithymia and binge eating further supports a possible association between numbing and unawareness of amounts of palatable food consumed. Alexithymia, a term describing an inability to identify and express emotions (Sifneos, 1996), appears to be common in adults with binge eating disorder (Pinaquy, Chabrol, Simon, Louvet, & Barbe, 2003) and has been found to be positively related to severity of binge eating (Carano, et al., 2006). Thus, it is possible that alexithymia may be related to dissociative experiences such as “numbing” and may contribute to uncertainty about amounts of food consumed among those with LOC.

It is important to note that while “numbing” is one possible explanation for the misreporting of palatable foods among youth with LOC, there are likely other theories that might account for our findings. For example, a desire to consume foods that are perceived as socially acceptable (e.g., healthy foods) has been associated with misreporting of energy intake in adult (Maurer, et al., 2006; Scagliusi, et al., 2003) and child studies (Livingstone & Robson,

2000). Binge eating has been linked to craving sweets (White & Grilo, 2005) and there are data indicating that carbohydrate consumption may be the result of cravings similar to an addictive model (Corsica & Spring, 2008; Spring, et al., 2008). Therefore, it is possible that children with LOC eating patterns who are prone to crave carbohydrate-laden, sweet foods might view consumption of such foods as unhealthy and therefore socially unacceptable. Such perception might cause them to under-report the amount of carbohydrate-dense and sweet foods consumed.

Strengths of the current study include the inclusion of a relatively large sample of non-treatment seeking boys and girls varying in body composition and age. Furthermore, we used a semi-structured clinical interview to assess the presence of LOC eating in addition to a well-controlled multi-item laboratory test meal. Study limitations include the cross-sectional design which precludes causal inferences. In addition, despite the fact that children were not seeking treatment, they were not recruited in a population-based fashion. Therefore, because of their willingness to participate in metabolic studies at the NIH, study children may have differed from the general population. Moreover, although LOC youth were more likely than those without reported LOC to perceive experiencing LOC during test meals, we did not specifically gather information about whether youth experienced “numbing” during the meal visit. Therefore, it is not possible to discern whether reporting inaccuracies were due to “numbing” per se in youth with LOC. In conclusion, greater reporting inaccuracies in percentage of calories consumed from carbohydrates and dessert intake were found among youth reporting LOC eating as compared to youth without LOC. Although these cross-sectional data cannot provide support for a causal mechanism for excess weight gain among youth with LOC, greater discrepancies may perhaps translate into over-consumption of palatable foods outside of the laboratory due to an unawareness of how much sweet foods are being consumed. Further research is required to determine if such reporting discrepancies are predictive of excess body weight gain over time. Future studies also are necessary to investigate possible mechanisms for such inaccuracies, including feelings of “numbing” and the possibility that youth with LOC may present with elevated alexithymia.

Acknowledgments

Intramural Research Program, NIH, grant Z01-HD-00641 (to J. Yanovski) from the NICHD, supplemental funding from NCMHD (to J. Yanovski), NIDDK grant 1R01DK080906-01A1 (to M. Tanofsky-Kraff), USUHS grant R0721C (to M. Tanofsky-Kraff). J. Yanovski and M. Kozlosky are commissioned officers in the U.S. Public Health Service, DHHS.

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Figure 1.

Percentage body fat was negatively correlated with the directional difference in reporting accuracy for total energy intake ($r=-0.30$, $p<0.01$), such that greater percentage adiposity was associated with greater under-reporting of intake.

Figure 2.

Adjusted $M \pm SE$ absolute difference scores for total intake, macronutrients, salty snack intake, and dessert intake. No LOC: Youth reporting no loss of control episodes in the month prior to assessment. LOC: Youth reporting ≥ 1 episode in the month prior to assessment. A: Absolute difference scores for macronutrients adjusted for age, race (non-Hispanic, White vs. Other), percentage fat mass, fat-free mass (kg), height (m), percentage macronutrient consumed, and meal instruction. B: Absolute difference scores for total intake, dessert intake, and salty snack intake adjusted for age, race (non-Hispanic, White vs. Other), percentage fat mass, fat-free mass (kg), height (m), total energy consumed (kcal), and meal instruction. Compared to youth without LOC, youth with LOC were less accurate in reporting percentage intake from carbohydrate ($p=0.01$) and dessert intake ($p=0.04$).

Table 1

Reporting inaccuracy for total energy intake, macronutrients, salty snack intake, and dessert intake among youth with and without loss of control (LOC) eating.

	LOC (n=42)	No LOC (n=114)	Comparison Between Groups	
	M±SE	M±SE	F	p
Total Intake (kcal)				
Directional difference ¹	153.0 ± 59.6	96.9 ± 36.0	0.66	0.42
Absolute difference ²	356.7 ± 44.6	338.9 ± 27.0	0.12	0.73
Carbohydrate (%)				
Directional difference ¹	5.9 ± 3.0	5.6 ± 1.8	0.01	0.93
Absolute difference ²	31.0 ± 2.2	24.6 ± 1.3	6.52	0.01
Fat (%)				
Directional difference ¹	8.6 ± 2.0	4.4 ± 1.2	3.17	0.08
Absolute difference ²	20.4 ± 1.6	19.5 ± 1.0	0.27	0.61
Protein (%)				
Directional difference ¹	2.6 ± 0.8	2.1 ± 0.5	0.30	0.59
Absolute difference ²	7.0 ± 0.7	6.8 ± 0.4	0.03	0.87
Salty Snack Intake (kcal)				
Directional difference ¹	57.8 ± 17.3	51.1 ± 10.4	0.11	0.74
Absolute difference ²	84.6 ± 15.3	77.9 ± 9.3	0.14	0.71
Dessert Intake (kcal)				
Directional difference ¹	63.2 ± 25.1	46.9 ± 15.2	0.31	0.58
Absolute difference ²	155.5 ± 19.8	107.1 ± 12.0	4.44	0.04

¹ Reported intake minus actual intake.

² Absolute value of reported intake minus actual intake. Reported M±SE values for macronutrients are adjusted for age, race (non-Hispanic, White vs. Other), percentage fat mass, fat-free mass (kg), height (cm), percentage of macronutrient consumed, and meal instruction. Reported M±SE values for total intake, salty snack intake, and dessert intake are adjusted for age, race (non-Hispanic, White vs. Other), percentage fat mass, fat-free mass (kg), height (cm), total intake (kcal) consumed, and meal instruction.