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Gender and Racial/Ethnic Differences in Binge Eating Symptoms in a Nationally Representative Sample of Adolescents in the United States

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Abstract

Objective—Binge eating disorder (BED) is the most prevalent eating disorder in the U.S. adolescent population. Both BED and subthreshold binge eating disorder (SBED) are associated with physical and mental health problems. Gender and racial/ethnic differences in prevalence of binge eating in a nationally representative sample of adolescents have been reported but have not yet been assessed in relation to individual symptoms of binge eating. We examined gender and racial/ethnic differences in endorsement of eight binge eating symptoms in a nationally representative sample of U.S. adolescents.

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Conflict of Interest

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Contributors

A. Lee-Winn contributed to the study conceptualization, acquisition of data, analysis and interpretation of the acquired data, and drafting and revision of the manuscript. S. Reinblatt, R. Mojtabai, and T. Mendelson contributed to interpretation of the study results and critical revision of the manuscript. All authors have approved the final manuscript.

Methods—We used data from the National Comorbidity Survey-Adolescent Supplement (NCS-A; 2001–2004), a nationally representative cross-sectional study of adolescents aged 13 to 18 years (n=9,336). We compared binge eating symptoms across genders and racial/ethnic groups using multivariable regression models.

Results—Females endorsed more binge eating symptoms than males associated with loss of control ('eat when not hungry' (adjusted prevalence ratio [aPR]=1.18, 95% confidence interval [CI]=1.02, 1.37, p=0.024) and distress (e.g., 'afraid of weight gain while binge eating' [aPR=3.29, CI=2.43, 4.47, p<0.001). Racial/ethnic minorities displayed different patterns of binge eating symptoms than non-Hispanic Whites. Hispanics reported being more 'afraid of weight gain while binge eating' (aPR=2.05, CI=1.25, 3.37, p=0.006) than non-Hispanic Blacks.

Discussion—Our findings suggest significant gender and racial/ethnic differences in binge eating symptom presentation. Future work should explore reasons for these gender and racial/ethnic differences and consider these differences when determining how best to prevent and treat binge eating in adolescents.

Keywords

Binge eating disorder; National Comorbidity Survey Adolescent Supplement (NCS-A); Gender differences; Racial/ethnic differences; Adolescents; Psychiatric epidemiology

1. Introduction

Adolescence is a critical period of increased vulnerability to eating disorders (Shapiro-Weiss & Shapiro-Weiss, 2001), including binge eating disorder (BED) (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). BED, a new diagnosis in DSM5 (American Psychiatric Association, 2013), is characterized as recurrent consumption of unusually large quantities of food (i.e., overeating) with a sense of loss of control and marked distress. BED is associated with obesity (Marcus & Wildes, 2013; Neumark-Sztainer et al., 2007; Stankovic & Potenza, 2010) and comorbid with almost all major psychiatric disorders (Fairburn et al., 1998; Hudson, Hiripi, Pope, & Kessler, 2007; Swanson et al., 2011). BED is the most prevalent eating disorder among adolescents in the U.S. general population (1.6%) (Swanson et al., 2011). In contrast to adults, however, it may be difficult to differentiate adolescent binge eating from eating a large amount of food due to developmentally-appropriate growth spurts. Youth may also report fewer episodes of binge eating than are required to meet diagnostic criteria for BED, resulting in lower prevalence of full threshold BED in children and adolescents as compared with adults (Tanofsky-Kraff, 2008). Subthreshold binge eating disorder (SBED), characterized as recurrent overeating with a sense of loss of control that does not meet full BED diagnostic criteria, is an important problem in its own right, as it is associated with negative mental and physical health outcomes, including future development of BED (Sonnewille et al., 2013; Stice, Marti, Shaw, & Jaconis, 2009; Swanson et al., 2011; Tanofsky-Kraff et al., 2011).

Swanson and colleagues' study using the National Comorbidity Survey-Adolescent Supplement (NCS-A) dataset showed lifetime BED prevalence was almost three times as high among female adolescents (2.3%) as male adolescents (0.8%) (Swanson et al., 2011);

lifetime SBED prevalence among adolescents, however, did not differ by gender (female: 2.6%; male: 2.3%) (Swanson et al., 2011). Reasons for this pattern of gender differences in BED versus SBED are not yet well understood. Previous non-epidemiological studies have shown that males and females with binge eating experienced similar clinical impairment (Striegel, Bedrosian, Wang, & Schwartz, 2012). Male adults (Striegel-Moore et al., 2009) and adolescents (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002) in fact reported *more* overeating than females; however, males were less likely than females to endorse perceived loss of control, one of the symptoms of BED (Lewinsohn et al., 2002; Striegel-Moore et al., 2009). Male adolescents also reported fewer binge eating symptoms related to binge eating-related distress and were less likely to report wanting treatment or having been treated for eating problems (Lewinsohn et al., 2002). Assessing potential gender differences in *particular symptoms* associated with binge eating may provide more nuanced information to inform our understanding of this pattern of findings, and use of epidemiological data would provide results generalizable to the general U.S. adolescent population.

Research also suggests that prevalence of binge eating behavior may differ by race and ethnicity. Hispanics were found to have higher prevalence of lifetime BED than other racial/ethnic groups, and non-Hispanic Blacks, Hispanics, and other racial/ethnic minority groups showed higher prevalence of SBED than non-Hispanic Whites (Swanson et al., 2011). State-wide surveys of disordered eating behaviors among adolescents showed that Hispanic females most frequently reported binge eating (Croll, Neumark-Sztainer, Story, & Ireland, 2002). A study with a national sample of U.S. college participants showed binge eating was the best predictor of distress in non-Hispanic White, African American, and Latino respondents (Franko, Becker, Thomas, & Herzog, 2007). Binge eating appears to be a significant issue among racial/ethnic minority adolescents (Croll et al., 2002; French et al., 1997; Elliott, Tanofsky-Kraff, & Mirza, 2013; Johnson, Rohan, & Kirk, 2002; Neumark-Sztainer et al., 2002; A. E. Field, Colditz, & Peterson, 1997); however no studies, to the authors' knowledge, have investigated racial/ethnic differences in symptoms of binge eating among adolescents or assessed whether gender differences in adolescent binge eating vary by race/ethnicity using nationally representative data. Identifying gender and racial/ethnic differences in binge eating symptoms is an important first step toward understanding patterns of risk for binge eating and developing gender- and cultural-specific interventions to address binge eating concerns and to reduce potential health disparities.

This study assessed gender and racial/ethnic differences in binge eating symptoms in the general population using data from the NCS-A (Kessler, Avenevoli, Costello, et al., 2009; Merikangas, Avenevoli, Costello, Koretz, & Kessler, 2009). We investigated potential disparities by gender and race/ethnicity (non-Hispanic Whites, non-Hispanic Blacks, and Hispanics) with respect to endorsement of eight binge eating symptoms. Based on past research and Bem's gender schema theory (Bem, 1981) – which highlights the transactional relationship between cultural beliefs about gender and individuals' development and expression of culturally-based expectations regarding males and females from an early age – we hypothesized that females would endorse more binge eating symptoms associated with loss of control and distress due to binge eating than males. Because gender- or race/ethnicity-specific psychosocial, environmental, and economic factors may play a role in the development and maintenance of problematic eating (George & Franko, 2010) and these

factors may be interrelated, we further explored adolescent race/ethnicity (Kelly, Wall, Eisenberg, Story, & Neumark-Sztainer, 2005; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Perry, Rosenblatt, & Wang, 2004; Ricciardelli, McCabe, Williams, & Thompson, 2007) as a potential moderator of the associations between gender and binge eating symptoms. We examined each binge eating symptom individually to better understand which indicators of loss of control and distress are relevant across gender and racial/ethnic groups to inform treatment and prevention efforts.

2. Methods

2.1 Study Design and Participants

The NCS-A is a nationally representative, cross-sectional survey of mental health with a sample of 10,148 adolescents aged 13 to 18 years. Detailed description of the NCS-A's background, measures, and design is provided elsewhere (Kessler, Avenevoli, Costello, et al., 2009; Kessler, Avenevoli, Green, et al., 2009; Merikangas et al., 2009). The data include prevalence estimates, correlates, and service use patterns for DSM-IV disorders. We received approval to access the restricted NCS-A data from the Interuniversity Consortium for Political and Social Research and also obtained Johns Hopkins Bloomberg School of Public Health IRB approval for this study.

Because this study focused on possible differences in symptoms across non-Hispanic White, non-Hispanic Black, and Hispanic adolescents, we excluded the heterogeneous 'Other' racial/ethnic category (n=615) from our analysis. We intended to assess symptoms in adolescents with BED or SBED and therefore excluded adolescents who met lifetime criteria for anorexia nervosa (AN: n=34) or bulimia nervosa (BN: n=86) and who reported engaging in recurrent overeating but did not meet the criteria for BED or SBED (n=77). Of the remaining 9,336 adolescents, we included 149 (1.60%) who met the criteria for lifetime BED, 256 (2.74%) who met the criteria for lifetime SBED, and 8,931 (95.66%) who did not meet the criteria for either.

2.2 Measures

The NCS-A utilized a modified version of the World Health Organization Composite International Diagnostic Interview (CIDI) Version 3.0 (Kessler & Üstün, 2004) administered by lay interviewers to ascertain binge eating diagnosis and symptoms among adolescents. The CIDI is a widely used diagnostic instrument that has exhibited good psychometric properties (Green et al., 2012; Kessler, Avenevoli, Green, et al., 2009). All items in this study were dichotomous (yes/no) self-reported responses.

The stem question for the BED and SBED assessment in the NCS-A asked whether the respondent had ever engaged in overeating at least twice a week for three months or longer. The NCS-A's definition of SBED differed from most pre-DSM-5 definitions of SBED in the following ways: it specified frequency of binge episodes as being at least twice weekly rather than once and included less stringent requirements for meeting full BED diagnostic criteria (see Appendix A and B for a detailed description of the NCS-A's BED/SBED diagnostic criteria).

2.2.1 Endorsement of eight symptoms of binge eating disorder—The structured interview in the NCS-A assessed eight binge eating symptoms for all adolescents who endorsed recurrent overeating in the stem question, in order to evaluate whether they met the criteria for BED, SBED, or neither (see Appendix A and B for the NCS-A's BED/SBED diagnostic criteria). In addition to 'eating much more quickly than usual' as an indicator of a binge eating episode, we assessed four symptoms that indicated a sense of lack of control during the episode of binge eating: 1) eating until feeling uncomfortably full; 2) binge eating when not hungry; 3) eating alone due to embarrassment about binge eating; and 4) being often upset both during and after binge eating. Marked distress due to binge eating was operationalized by: 1) being often upset both during and after binge eating; 2) feeling guilty, upset, or depressed after binge eating; 3) worrying about the effects of binge eating on health, weight, or body shape; and 4) being afraid to gain weight while binge eating. *Being often upset during and after binge eating* was an indicator of both loss of control and marked distress due to binge eating (see Appendix A and B for the NCS-A's BED/SBED diagnostic criteria).

2.2.2. Sociodemographic variables—Adolescents were asked to report their gender, race/ethnicity, age, and years of education.

2.3 Statistical Analyses

We calculated descriptive statistics for each demographic variable (age, education, gender, and race/ethnicity) and their relations to our dependent variables of interest (eight binge eating symptoms) using weighted Chi-square tests. We also checked for distribution normality of continuous variables. We used generalized linear modeling to fit regression models with a modified Poisson approach to estimate adjusted prevalence ratios (Barros & Hirakata, 2003; Zou, 2004). Adolescent gender and race/ethnicity were our two independent variables of interest.

We first performed unadjusted analyses and then adjusted analyses. Since the NCS-A sample consists of both household and school samples of adolescents, we decided to adjust for both adolescents' age and years of education in our analyses. For the gender–binge eating symptoms model, we adjusted for adolescents' age, education, and race/ethnicity as these variables were associated with eating disorders in previous studies (Hudson et al., 2007; Marques et al., 2011; Swanson et al., 2011; Thompson-Brenner et al., 2013). For the race/ethnicity–binge eating symptoms model, we adjusted for adolescents' age, education, and gender. Other sociodemographic correlates (parental marital status, household income, and urbanicity) were not associated with eating disorders in the NCS-A (Swanson et al., 2011), and thus they were not included in the models. As no significant differences were found between models estimated with versus without parental education, we did not include parental education in our final analyses.

Finally, we explored adjusting for lifetime major depressive disorder (MDD) in addition to age, education and race/ethnicity in our models since depression is more prevalent in female adolescents (Merikangas et al., 2010) and Hispanic youth (Anderson & Mayes, 2010; Twenge & Nolen-Hoeksema, 2002) and is associated with binge eating (Swanson et al.,

2011). As the unadjusted and adjusted models' outcomes did not differ, we did not control for lifetime MDD in our final analyses.

To assess adolescent race/ethnicity as a potential moderator of the gender–binge eating symptoms relationships, we dichotomized race/ethnicity (non-Whites vs. Whites) and then created an interaction term between gender and race/ethnicity (gender $\times$ race/ethnicity) and entered the relevant term into our regression models with eight binge eating symptoms as the dependent variables. If the coefficient for an interaction term was significant, we conducted race/ethnicity-stratified analyses to identify how the gender–binge eating symptoms relationships differed across three racial/ethnic groups.

Listwise deletion by default was used to handle missing data since fewer than 2% of responses were missing. We followed the NCS-A guidelines and applied complex survey weights with proper variables prior to analyses to account for the clustered nature of the survey data. Statistical significance was set at p-values less than 0.05. All analyses were performed using Stata12 (StataCorp, 2011).

3. Results

3.1 Sample Characteristics

Table 1 displays the participants' demographic information. As reported by Swanson and colleagues (Swanson et al., 2011), the BED group differed from the comparison group with regard to gender ($\chi^2=29.58$, $p=0.002$), with a greater proportion of female adolescents in the BED group, whereas the SBED group was different than the comparison group with regard to race/ethnicity ($\chi^2=16.61$, $p=0.002$), with a greater proportion of racial/ethnic minority adolescents in the SBED group. Age and education did not differ by binge eating status (see Table 1).

3.2 Endorsement of Binge Eating Symptoms

There were no gender differences in responses to the stem question assessing prevalence of lifetime recurrent overeating (i.e., ever engaging in overeating at least twice a week for several months or longer) (aPR=1.32, CI=0.86, 2.04 $p=0.198$). Compared to males, however, females reported more indicators of loss of control ('eat when not hungry' [aPR=1.18, CI=1.02, 1.37, $p=0.024$]; 'upset both during and after binge eating'¹ [aPR=2.27, CI=1.37, 3.76, $p=0.002$]) and marked distress due to binge eating ('upset both during and after binge eating'¹ [aPR=2.27, CI=1.37, 3.76, $p=0.002$], 'feel guilty, upset, or depressed after binge eating' [aPR=2.55, CI=1.46, 4.45, $p=0.002$], 'worry about binge eating effects on health, weight, or body shape' [aPR=2.06, CI=1.46, 2.90, $p<0.001$], and 'afraid of weight gain while binge eating' [aPR=3.29, CI=2.43, 4.47, $p<0.001$]) in our adjusted model (see Table 2).

Non-Hispanic Blacks and Hispanics showed higher prevalence of lifetime recurrent overeating than non-Hispanic Whites in our adjusted model (aPR=1.49, CI=1.08, 2.07, $p=0.017$ and aPR=1.65, CI=1.12, 2.43, $p=0.013$, respectively). No differences in lifetime prevalence

¹This symptom is considered an indicator of both loss of control and marked distress due to binge eating

of recurrent overeating were found between non-Hispanic Blacks and Hispanics. Compared to non-Hispanic Whites, non-Hispanic Blacks showed 0.48 times lower prevalence of 'feeling guilty, upset, or depressed after binge eating' (CI=0.23, 0.99, $p=0.047$) and 0.59 times lower prevalence of being 'afraid of weight gain while binge eating' (CI=0.40, 0.88, $p=0.010$) in our adjusted model. Compared to non-Hispanic Whites, Hispanics reported being more 'upset both during and after binge eating' (aPR=1.48, CI=1.05, 2.09, $p=0.027$) in our adjusted model; whereas, compared to non-Hispanic Blacks, Hispanics reported being more 'afraid of weight gain while binge eating' (aPR=2.05, CI=1.25, 3.37, $p=0.006$) in our adjusted model (See Table 2).

Race/ethnicity did not moderate the associations between gender and eight binge eating symptoms.

4. Discussion

As hypothesized, females reported more symptoms associated with loss of control and distress due to overeating than males. We found several racial/ethnic differences in endorsement of binge eating symptoms; while non-Hispanic Blacks reported less distress due to binge eating than non-Hispanic Whites, Hispanics reported more loss of control and distress than non-Hispanic Whites or non-Hispanic Blacks. Race/ethnicity did not moderate the gender–binge eating symptom associations.

Our findings are consistent with prior non-epidemiological studies that reported no gender differences in the frequency or the degree of problematic eating behavior (Barry, Grilo, & Masheb, 2002; Tanofsky, Wilfley, Spurrell, Welch, & Brownell, 1997) but found that females were more likely than males to endorse specific symptoms related to loss of control or distress due to binge eating (Lewinsohn et al., 2002; Striegel-Moore et al., 2009). Findings of our study suggest that these patterns are not limited to clinical samples but are also found in the general U.S. adolescent population.

There are several possible explanations for gender differences in symptoms related to loss of control and distress. From a sociocultural perspective, our findings are generally consistent with gender schema theory (Bem, 1981), in that symptom endorsement patterns tended to conform to gender-normative schemas. Males may be less likely to *report* eating-related distress or loss of control because expressing emotions may be more socially accepted and expected from females but often discouraged in males. However, it is also possible that males may not feel distressed or "out of control" when they overeat. A traditional view of problematic eating as a 'female issue' (Striegel-Moore, Silberstein, & Rodin, 1986) may hinder male adolescents from reporting binge eating symptoms or may influence males not to view binge eating as a problematic or distressing behavior (Tanofsky et al., 1997). Additional studies of males' eating and dieting behavior are needed. For instance, findings from a recent study on muscularity as a common concern among males suggests that some of males' eating- and weight-related problems may not fit well within the current diagnostic framework (Field et al., 2014). Future investigations incorporating qualitative approaches to assess both genders' perspectives on binge eating may clarify reasons for gender differences in symptom reporting and help guide formulation of tailored treatment plans. Different

approaches to raise awareness of overeating as a serious health issue that can affect both male and female adolescents may also help reduce problematic binge eating behavior.

Given that the prevalence of lifetime SBED was higher in both non-Hispanic Blacks and Hispanics than non-Hispanic Whites, exploration of potential reasons for differences in experience and/or reporting of binge eating is needed. We were not able to investigate potential gender or racial/ethnic differences in other weight- or body-related issues such as body image norms, preferences, and concerns since the NCS-A did not collect such information. Our findings on non-Hispanic Blacks reporting less distress than non-Hispanic Whites may reflect, in part, differences in cultural attitudes toward eating, weight, and body image between the two racial/ethnic communities. Research suggests Black youth show greater acceptance of larger body shapes and higher body satisfaction (Kelly, Wall, Eisenberg, Story, & Neumark-Sztainer, 2005; Paxton, Eisenberg, & Neumark-Sztainer, 2006; Perry, Rosenblatt, & Wang, 2004; Ricciardelli, McCabe, Williams, & Thompson, 2007) and lower frequency of using self-weighing as a weight control strategy (Quick, Loth, MacLehose, Linde, & Neumark-Sztainer, 2013) than White youth. On the other hand, we found that Hispanics reported more loss of control and distress than non-Hispanic Whites and non-Hispanic Blacks. A study of BED rates and symptoms in Latino adults in the U.S. found positive associations between length of exposure to the U.S. and BED rates but no differences in BED symptoms with regard to place of onset (U.S. vs. Mexico), suggesting that non-specific migration-related factors related to increased risks for broader psychopathology, rather than cultural differences regarding attitudes toward eating, may be associated with increased BED risks (Swanson et al., 2012). Further assessment of potential acculturation-related stress, as well as intergenerational attitudes and beliefs towards eating and weight in Hispanic adolescents and their associations with binge eating, is warranted.

While research findings raise the question of whether culturally-sensitive diagnostic tools and prevention programs may be useful (Cassidy et al., 2013), few culturally appropriate screening tools or treatments exist for racial/ethnic minorities with eating disorders (Lester, 2007). Future research providing insight into racial/ethnic differences in binge eating symptom presentation may enhance our understanding of the role of cultural factors in development and maintenance of problematic eating behaviors. Our findings highlight the importance of recognizing variability in binge eating symptoms across gender and racial/ethnic groups.

Our findings on gender and racial/ethnic differences in adolescents with binge eating symptoms could inform prevention efforts that promote emotion regulation, for instance, to reduce maladaptive emotion-focused coping related to problematic eating (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Ball & Lee, 2000; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Our findings may also help guide future studies that examine personalized treatments for a specific gender or racial/ethnic group. It is important for treatment-focused research to explore the clinical implications of our findings. For instance, it is conceivable that treatments focusing on emotional or social cues could be of particular interest in treating females, given our finding that adolescent females more frequently endorsed emotion-related binge eating symptoms (e.g., feel guilty, upset, or

depressed after binge eating) than males. Further research is needed to guide treatment and prevention efforts.

This study has several limitations. The NCS-A survey was conducted in 2001–2004; different results may have been obtained if the study was conducted more recently. The NCS-A also used layperson interviews to gather information, as interviews administered by a clinician are generally not feasible for a population-based survey. The eating disorder section of the CIDI, a widely used measure with good concordance with clinician diagnoses in adults (Kessler, Avenevoli, Green, et al., 2009), was not thoroughly validated in adolescents. Information on body mass index was not collected, so we could not assess its association with binge eating. We were unable to explore gender or racial/ethnic differences in body image norms, preferences, or concerns, as the NCS-A did not collect such information. As the NCS-A stem question specified frequency (at least twice a week) and duration (for several months or longer) of binge eating, we were unable to assess binge eating behaviors in adolescents who binged less frequently or for a shorter period. The NCS-A's definition SBED differed from most pre-DSM-5 definitions of SBED; thus, our findings may not be directly comparable to those of some prior studies. Self-reported responses on binge eating may have been influenced by memory bias (Fredrickson, 2000). Self-reports, however, are not necessarily unsound or less valid than clinical assessments (Chan, 2009).

5. Conclusions

Despite these limitations, our use of data from a nationally representative sample enhances study generalizability, and findings of this study extend current knowledge regarding gender and racial/ethnic differences in binge eating among adolescents. Binge eating deserves clinical attention due to its negative and often long-lasting consequences such as childhood obesity (Marcus & Wildes, 2013; Stankovic & Potenza, 2010), which may put children and adolescents at greater risk for serious health issues (Han, Lawlor, & Kimm, 2010; Stankovic & Potenza, 2010; Stewart, 2011). Our findings on gender and racial/ethnic symptom variabilities have implications for informing intervention efforts for binge eating behavior, as well as prevention practices that promote healthy eating, in a diverse adolescent population.

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Appendix A

Algorithm for Binge Eating Disorder

- A. Both 1 and 2

1. Recurrent episodes of eating, in a discrete period of time (e.g., within any 2 hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances
2. A sense of lack of control over eating disorder during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating), indicated by one (or more) of the following:
 1. eating until feeling uncomfortably full,
 2. eating large amounts of food when not feeling hungry,
 3. eating alone because of being embarrassed by how much one is eating, or
 4. being often upset both during and after binge eating.
- B. The binge eating episodes are associated with three (or more) of the following:
 1. eating much more quickly than usual,
 2. eating until feeling uncomfortably full,
 3. eating large amounts of food when not feeling hungry,
 4. eating alone because of being embarrassed by how much one is eating, or
 5. feeling guilty, very upset with oneself, or depressed after binge eating
- C. The binge eating episodes are accompanied with marked distress regarding binge eating, indicated by one (or more) of the following:
 1. feeling guilty, very upset with oneself, or depressed after binge eating
 2. worry about the long term effects of binge eating on health, weight, or on body shape
 3. around the time binging—very afraid you would gain weight
 4. being often upset during and after binge eating
- D. The binge eating occurs, on average at least 2 days a week for 3 months
- E. The binge eating is not associated with the regular use of inappropriate compensatory behaviors (e.g., purging, fasting, excessive exercise) and

does not occur exclusively during the course of Anorexia Nervosa or Bulimia Nervosa.

Appendix B

Algorithm for Subthreshold Binge Eating

- A. Both 1 and 2
 1. Recurrent episodes of eating, in a discrete period of time (e.g., within any 2 hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances
 2. A sense of lack of control over eating disorder during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating), indicated by one (or more) of the following:
 1. eating until feeling uncomfortably full,
 2. eating large amounts of food when not feeling hungry,
 3. eating alone because of being embarrassed by how much one is eating, or
 4. being often upset both during and after binge eating.
- B. The binge eating occurs, on average at least 2 days a week for 3 months

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Highlights

- Female adolescents reported more loss of control and distress due to binge eating.
- Males may experience and/or interpret binge eating differently than females.
- Racial/ethnic minority adolescents showed different patterns of BED symptoms.
- Non-Hispanic Blacks reported less distress than non-Hispanic Whites.
- Hispanics reported more loss of control and distress than other race/ethnic groups.

Table 1

Sociodemographic characteristics of participants with lifetime BED or SBED in the National Comorbidity Survey: Adolescent Supplement (2001–2004)

Characteristics	Lifetime BED (n=149)	Lifetime SBED (n=256)	Comparison Group ^a (n=8,931)
Gender (n, %)			
Female	106 (71.14)	118 (46.09)	4,514 (50.54)
Male (=ref.)	43 (28.86)	138 (53.91)	4,417 (49.46)
Race/Ethnicity (n, %)			
Non-Hispanic Black	34 (22.82)	78 (30.47)	1,794 (20.09)
Hispanic	34 (22.82)	58 (22.66)	1,782 (19.95)
Non-Hispanic White (=ref.)	81 (54.36)	120 (46.88)	5,355 (59.96)
Age (mean±SD)	15.55±1.49	15.32±1.56	15.17±1.50
Education ^b (mean±SD)	9.02±1.57	8.87±1.58	8.75±1.59

BED=binge eating disorder; SBED=subthreshold binge eating disorder; ref.=reference; SD= standard deviation

^a Adolescents without lifetime AN, BN, BED, SBED, or recurrent overeating

^b Missing data on education: lifetime BED (n=1); lifetime SBED (n=3); comparison group (n=26)

Note. Weighted Chi-square tests were conducted to compare sociodemographic characteristics of participants with lifetime BED and SBED to the comparison group. Results in bold font indicate differences are significant at $p < 0.05$.

Table 2

Gender and racial/ethnic differences in endorsement of binge eating symptoms in the National Comorbidity Survey: Adolescent Supplement (2001–2004)

Adjusted Prevalence Ratio [†] (95% Confidence Interval)								
Loss of Control					Marked Distress			
	Eat too quickly	Eat until uncomfortably full	Eat when not hungry	Eat alone because embarrassed	Upset both during and after binge eating ^a	Feel guilty, upset, or depressed after binge eating	Worry about binge eating effects on health, weight, or body shape	Afraid of weight gain while binge eating
Gender								
Female vs. Male (=ref.)	0.85 (0.66, 1.09)	0.85 (0.72, 1.02)	1.18 [*] (1.02, 1.37)	1.87 (0.98, 3.57)	2.27 ^{**} (1.37, 3.76)	2.55 ^{**} (1.46, 4.45)	2.06 ^{***} (1.46, 2.90)	3.29 ^{***} (2.43, 4.47)
Race/Ethnicity								
Non-Hispanic Black vs. Non- Hispanic White (=ref.)	0.95 (0.70, 1.30)	0.88 (0.75, 1.03)	1.01 (0.86, 1.18)	0.90 (0.46, 1.78)	0.97 (0.51, 1.84)	0.48 [*] (0.23, 0.99)	0.96 (0.61, 1.51)	0.59 [*] (0.40, 0.88)
Hispanic vs. Non-Hispanic White (=ref.)	1.01 (0.65, 1.57)	0.97 (0.75, 1.26)	0.98 (0.75, 1.29)	1.59 (0.74, 3.40)	1.48 [*] (1.05, 2.09)	0.93 (0.58, 1.49)	1.20 (0.87, 1.67)	1.21 (0.92, 1.60)
Hispanic vs. Non-Hispanic Black (=ref.)	1.06 (0.64, 1.76)	1.11 (0.85, 1.45)	0.97 (0.73, 1.30)	1.76 (0.81, 3.80)	1.52 (0.89, 2.61)	1.94 (0.84, 4.52)	1.25 (0.85, 1.85)	2.05 ^{**} (1.25, 3.37)

ref.=reference

[†] Adjusted for adolescents' race/ethnicity, age, and education^a Indicator of both loss of control and marked distress because of binge eating^{*} p<0.05,^{**}

p<0.01,

^{***}

p<0.001