Published in final edited form as:

Appetite. 2015 December 1; 95: 269–274. doi:10.1016/j.appet.2015.07.015.

Effectiveness of lifestyle interventions to reduce binge eating symptoms in African American and Hispanic women

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Abstract

Objective—Lifestyle interventions that promote physical activity and healthy dietary habits may reduce binge eating symptoms and be more feasible and sustainable among ethnic minority women, who are less likely to seek clinical treatment for eating disorders. The purpose of this study was to investigate (1) whether participating in a lifestyle intervention is a feasible way to decrease binge eating symptoms (BES) and (2) whether changes in BES differed by intervention (physical activity vs. dietary habits) and binge eating status at baseline (binge eater vs. non-binge eater) in African American and Hispanic women.

Method—Health Is Power (HIP) was a longitudinal randomized controlled trial to promote physical activity and improve dietary habits. Women ($N=180$) who completed anthropometric measures and questionnaires assessing fruit and vegetable and dietary fat intake, BES and

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Disclosure of Conflicts

The authors have no conflicts of interest to report and wish to thank Penny L. Wilson, PhD, RDN, CSSD, LD of Eating for Performance and the Understanding Neighborhood Determinants of Obesity (UNDO) research team at the Texas Obesity Research Center (TORC) for their assistance throughout the Health Is Power (HIP) study.

demographics at baseline and post-intervention six months later were included in the current study.

Results—Over one-fourth (27.8%) of participants were categorized as binge-eaters. Repeated measures ANCOVA analyses ANOVA demonstrated significant two- and three-way interactions. Decreases in BES over time were greater in binge eaters than in non-binge eaters ($F(1,164)=33.253, p<.001$), and women classified as binge eaters who participated in the physical activity intervention reported greater decreases in BES than non-binge eaters in the dietary habits intervention ($F(1,157)=5.170, p=.024$).

Discussion—Findings suggest behavioral interventions to increase physical activity may lead to reductions in BES among ethnic minority women and ultimately reduce the prevalence of binge eating disorder and health disparities in this population.

Keywords

binge eating disorder; exercise; energy intake; intervention study; minority health; women's health

Introduction

Binge Eating Disorder (BED), defined as “recurring episodes of eating significantly more food in a short period of time than most people would eat under similar circumstances, with episodes marked by feelings of lack of control (American Psychiatric Association, 2013),” is the most common eating disorder in the United States, with a lifetime prevalence of 4.5% for any binge-eating behavior compared to only 0.6% and 1.0% for anorexia and bulimia nervosa, respectively (Hudson, Hiripi, Pope, & Kessler, 2007). Prior research has shown that in community samples, the prevalence of BED and sub-threshold BED ranges from 1.4% to 4.5% in African American women (Striegel-Moore et al., 2003; Striegel-Moore, Dohm, et al., 2000), and the lifetime prevalence estimate is 2.3% for Hispanic or Latina women (Alegria et al., 2007). However, the true prevalence of binge eating symptoms that precede a BED diagnosis may be much higher in non-treatment seeking samples. BED has been strongly associated with overweight and obesity (Guss, Kissileff, Devlin, Zimmerli, & Walsh, 2002; Hudson et al., 2007), and in samples seeking treatment for overweight and obesity, the prevalence of BED and subthreshold BED for African American women has been reported to be as high as 33.3% (Mazzeo, Saunders, & Mitchell, 2005). African American and Hispanic women have the highest rates of obesity of any racial/ethnic group or sex, with 56.6% of non-Hispanic black women and 44.4% of Hispanic women categorized as obese (Ogden, Carroll, Kit, & Flegal, 2013), which may, in part, result in a higher prevalence of BED and sub-threshold BED (Hudson et al., 2007; Masheb, Grilo, & Rolls, 2011).

Effective treatments for BED and sub-threshold BED-, are poorly understood in African American and Hispanic women. Ethnic minority women are less likely than other groups to seek treatment for eating disorders, including BED and sub-threshold BED (Cachelin, Rebeck, Veisel, & Striegel-Moore, 2001; Cachelin & Striegel-Moore, 2006) and are more likely to drop out of psychosocial treatment programs (Thompson-Brenner et al., 2013). This suggests that traditional BED treatments, including pharmacotherapy and psychotherapy,

may be less acceptable or accessible for African American and Hispanic women (Bulik, Brownley, & Shapiro, 2007). Treatment strategies that focus on prevention via promoting healthy lifestyles may be more feasible and sustainable for these populations and less intimidating than traditional psychosocial treatment programs for eating disorders (Thompson-Brenner et al., 2013).

Research to date suggests the potential effectiveness of lifestyle interventions, including those to improve dietary habits, increase physical activity, and promote weight loss, as a means to reducing BED and sub-threshold BED (Larose et al., 2014; Levine, Marcus, & Moulton, 1996; Vancampfort et al., 2013). Reeves et al. found a nutrition counseling intervention showed reductions in calories and dietary fat consumption, increases in carbohydrate and protein consumption, and reductions in binge days (Reeves et al., 2001). Another study combined dietary counseling to reduce energy density and promote weight loss with a traditional cognitive-behavioral therapy intervention and found it to enhance the positive effects of traditional strategies (Masheb et al., 2011). Although the literature suggests a positive association among healthy weight control practices, such as physical activity, and disordered eating behaviors (Hayes & Napolitano, 2012; Kelly-Weeder, Jennings, & Wolfe, 2012; Neumark-Sztainer, Eisenberg, Wall, & Loth, 2011), fewer studies have explored physical activity or exercise to prevent and control reduce disordered eating (Danielsen, Sundgot-Borgen, Maehlum, & Svendsen, 2014; Levine et al., 1996). Furthermore, there has been limited research on the effects of exercise or dietary habit interventions on disordered eating in nonclinical and predominantly African American and Hispanic samples, further suggesting the need for lifestyle interventions that focus on prevention of BED and sub-threshold BED in ethnic minority women.

The Health Is Power (HIP; NIH 1R01CA109403) project was a randomized controlled trial designed to increase physical activity and improve dietary habits in African American and Hispanic women (Lee, Mama, et al., 2011; Lee, Medina, et al., 2011; Lee et al., 2012). Previous work by the HIP research team suggests that binge eating symptoms may be more prevalent (over 30%) in this sample than previously reported in community samples (Alegria et al., 2007; Striegel-Moore et al., 2003; Striegel-Moore, Dohm, et al., 2000; Striegel-Moore, Wilfley, Pike, Dohm, & Fairburn, 2000; Wilson et al., 2012), presenting an ideal opportunity to explore whether a lifestyle intervention is effective for reducing binge eating symptoms, and ultimately BED, in ethnic minority women. The purposes of this study were (1) to investigate whether binge eating symptoms (BES) decreased as a result of participating in a lifestyle intervention and (2) to explore whether changes in BES differed by intervention group (physical activity versus dietary habits) and binge eating status (binger eater versus non-binge eater) in African American and Hispanic women. We hypothesized that overall decreases in BES as a result of participating in a lifestyle intervention would be minimal. However, we hypothesized that women in the dietary habits group would experience greater decreases in binge eating symptoms compared to women in the physical activity group and that women who reported being binge eaters would experience greater decreases in BES than non-binge eating controls above and beyond changes in dietary habits.

Material and Methods

Study Design

This longitudinal study relied on baseline (T1) and post-intervention (T2) assessment data from the HIP study, which took place from June 2006 to July 2008. Eligible African American and Hispanic women were randomized to a physical activity group or a dietary habits intervention group and attended six intervention sessions in their groups over 24 weeks. Although assessed during the HIP study, binge eating and BES were not explicitly discussed or addressed as part of the intervention. Details on the HIP study have been published previously and are briefly described below (Lee, Mama, et al., 2011; Lee, Medina, et al., 2011; Lee et al., 2012). All procedures were approved by the University of Houston's Committee for the Protection of Human Subjects, and all participants provided written informed consent prior to participation.

Participants and Procedures

African American and Hispanic women in Houston and Austin, Texas were recruited via print and electronic fliers and in-person at community events to participate in the study beginning in 2006. Women between 25 and 60 years old who were physically inactive were invited to attend the T1 assessment and completed computer-based questionnaires and a physical health assessment. Women (311 in Houston and 99 in Austin) enrolled in the study and completed a T1 assessment at the Texas Obesity Research Center at the University of Houston. Of those enrolled in Houston, 84.6% identified as African American and 15.4% identified as Hispanic; all participants in Austin identified as Hispanic. Upon completion of the baseline assessment, women completed a two week run-in period during which they completed additional questionnaires of interest. The purpose of the run-in period was to provide time for women to drop out of the study prior to randomization in an effort to enhance participant retention once randomized. Women ($N=310$) attended a randomization session approximately two weeks after their baseline assessment, where they were randomized by a member of the research team to a physical activity or dietary habits intervention group using a weighted, computer generated randomization procedure to produce an adequately powered sample to detect changes in the physical activity group. Participants in both groups attended six group cohesion intervention sessions over six months and worked toward a shared physical activity or vegetable and fruit consumption goal. Intervention sessions initially occurred biweekly and then monthly, were 60 minutes in length, and were led by two trained health educators (Lee, Medina, et al., 2011). Intervention session topics included goal setting, the benefits of being physically active or consuming more vegetables and fruit, self-efficacy, social support, and relapse prevention. Intervention content and procedures have been described in depth previously (Lee, Medina, et al., 2011; Lee et al., 2012). After a six month intervention, participants returned to complete a T2 assessment. Identical assessment procedures were followed at T1 and T2, and only participants with complete T1 and T2 data ($N=180$, 58.1% of those randomized) were included in the current study. Study completion rates were similar by intervention group; 58.3% of participants in the physical activity group and 52.8% of participants in the dietary habits group completed the study. Participants were compensated for their time and effort at

each assessment and received an incentive, such as a t-shirt, water bottle or lunch bag, at each intervention session.

Individual Measures

Anthropometry—Anthropometric measurements were taken at T1 and T2. Participants were asked to remove their shoes and heavy outer clothing. Trained staff measured participants' height using a mobile stadiometer (Seca 225, Chino, CA), and weight and percent body fat were measured using a body composition analyzer (Tanita TBF-310GS, Arlington Heights, IL). Measured height and weight were used to compute body mass index ($BMI = kg/m^2$). All measures were taken twice and averaged for use in analyses.

Demographics—Ethnicity, educational attainment, and household income were measured using the Maternal and Infant Health Assessment (MIHA) questionnaire (California Department of Public Health, 2006; Centers for Disease Control and Prevention, 2011). MIHA items have shown good reliability and have been used with samples representing diverse ethnicities (Sarnoff & Hughes, 2005).

Dietary Habits—Dietary habits were measured using the National Cancer Institute's Fruit and Vegetable Screener and Fat Screener (Thompson et al., 2007; Thompson et al., 2002). Fruit and vegetable consumption was reported in terms of frequency and amount consumed over the last month for 10 categories of fruit and vegetables. The Fruit and Vegetable Screener has adequate validity ($r = 0.68$ in men and 0.49 in women) in white adults when compared to the By-Meal Screener (Thompson et al., 2008), and has been used widely in both African American and Hispanic adult samples (Resnicow et al., 2000; Thompson et al., 2000; Thompson et al., 2002). A total number of fruit and vegetable servings reported per day at T1 and T2 were used in analyses.

The Fat Screener measures an individual's usual dietary fat intake over one year by measuring the frequency of consumption of 15 foods that best predicted percentage of energy from dietary fat and the use of reduced-fat margarine (Thompson et al., 2007). The Fat Screener has good validity ($r = 0.64$ in men and 0.58 in women) in adults when compared to true intake, as measured by 24-hour recall (Thompson et al., 2007), and has been used in African American and Hispanic samples to measure dietary fat intake (Parker, Coles, Logan, & Davis, 2010; Thompson et al., 2008). The total percent of calories from dietary fat consumed per day reported at T1 and T2 was used in analyses.

Binge Eating—The *Binge Eating Scale* (BES) is a self-report questionnaire that measures binge eating symptoms but does not provide a diagnosis of BED (Gormally, Black, Daston, & Rardin, 1982). The BES has 16 items describing behavioral manifestations and feelings/cognitions surrounding a binge episode (Gormally et al., 1982). Participants are asked to choose a response that best describes the way they feel, ranging from 0 (no/low severity of binge eating symptoms) to 3 (high severity of binge eating symptoms; (Gormally et al., 1982). A sum of the ratings provides an overall score of binge eating symptoms. Scores range from 0 to 48, and a higher score indicates greater severity of binge eating symptoms (Gormally et al., 1982; Timmerman, 1999). Studies in samples of African American and

white women have demonstrated strong internal consistency scores, ranging between 0.88-0.91 (Harrington, Crowther, Henrickson, & Mickelson, 2006; Mitchell & Mazzeo, 2004), and the Cronbach's alpha was .808 in our sample. Based on the criteria developed by Marcus, Wing, and Hopkins (1988), participants were categorized into groups of non-binge eaters (BES score <18), moderate bingers binge eaters (BES score 18-26), and severe bingers binge eaters (BES score >26).

Statistical Analysis

Descriptive analyses were completed to characterize participants and paired samples t-tests were used to explore changes in vegetable and fruit and dietary fat intake and BES from T1 to T2. Previous work by this research team found that 31.1% of African American and Hispanic women in HIP were classified as binge eaters (Wilson et al., 2012). Therefore, participants were categorized as non-binge eaters (BES score < 18) and binge eaters (BES score ≥ 18, includes moderate and severe binge eaters) for subsequent analyses (Marcus et al., 1988). A group by time repeated measures ANOVA model was used to examine changes in BES from T1 to T2, including covariates to control for significantly correlated demographic and dietary habits variables. Repeated measures analyses of covariance (ANCOVA) were used to examine changes in BES from T1 to T2, controlling for significantly correlated demographic and dietary habits variables, and to investigate whether changes differed by intervention group (physical activity versus dietary habits) and/or binge eating status (non-binge eater versus binge eater). Analyses were completed in IBM SPSS Statistics Version 22 (IBM Corporation, Armonk, NY), and a *p*-value of 0.05 was used as the criterion for statistical significance for all analyses.

Results

Women (*N*=180) were in their mid-to-late 40s (*M*=47.2±8.4 years) and of relatively high socioeconomic status (53.1% graduated from college and 59.6% reported an annual household income >\$82,600). Nearly three-fourths (73.3%) of participants were African American women. African American participants reported higher educational attainment (Fisher's exact $X^2(3)=16.880$, *p*<.001) and higher income (Fisher's exact $X^2(4)=10.857$, *p*=.019) and ate more vegetables and fruit ($F(1,179)=4.093$, *p*=.045) than Hispanic women at T1. Overall, women who completed a T2 assessment were slightly older (*M*=47.0 versus 43.5 years, *t*=-3.785, *p*<.001) and had higher educational attainment (54.2% vs. 35.3% were college graduates, $X^2(2)=15.475$, *p*<.001) and higher income (56% vs. 40.9% reported an income >\$82,600, $X^2(4)=13.371$, *p*=.010) compared to those who did not complete the study. There were no significant differences in dietary habits or binge eating symptoms between completers and non-completers at baseline.

In the current study subsample, 72.2% of women were classified as non-binge eaters (with a mean BES score of 9.0±4.7) and 27.8% as binge eaters (22.8% moderate and 5.0% severe, with a mean BES score of 23.3±5.0). Women who were classified as binge eaters reported greater dietary fat consumption (*M*=31.4% versus 32.9%) than non-binge eaters (*t*=-2.373, *p*=.019). Of the 180 participants, 68.0% were randomized to the physical activity group and 32.0% were randomized to the dietary habits group. There were no other significant

differences in baseline characteristics by intervention group assignment or binge eating status.

Body composition, fruit and vegetable and dietary fat intake, and BES scores by time point are shown in **Table 1**. At baseline, binge eating symptoms were significantly correlated with income ($r=-.164$, $p=.032$), BMI ($r=.164$, $p=.028$), and dietary fat intake ($r=.207$, $p=.005$). Therefore, income, BMI and dietary habits were controlled for in subsequent analyses. Although body composition did not significantly change during the 6-month intervention, dietary habits and binge eating symptoms improved. Overall, women significantly increased their vegetable and fruit intake by 0.7 servings ($t=2.681$, $p=.008$, $d=-0.2$), decreased their dietary fat intake by 1.6% ($t=-5.786$, $p<.001$, $d=0.4$), and decreased their BES score by 1.9 ($t=-4.520$, $p<.001$, $d=0.2$) from T1 to T2.

At post-intervention, 81.7% of women were classified as non-binge eaters and 18.3% as binge eaters (13.3% moderate and 5.0% severe). Of those classified as non-binge eaters at T2, 17.0% were formerly classified as binge eaters (15.6% moderate and 1.4% severe) at T1 ($X^2(4)=56.2$, $p<.001$). In other words, 50% of women classified as binge eaters at T1 were classified as non-binge eaters at T2 ($X^2(1)=46.4$, $p<.001$). Results by group indicate that slightly more women in the physical activity group (19.6%; $X^2(1)=24.4$, $p<.001$) who were previously classified as binge eaters at T1 were reclassified as non-binge eaters at than women in the dietary habits group (13.3%; $X^2(1)=21.1$, $p<.001$).

After controlling for income, BMI and dietary habits at T1, repeated measures ANCOVA ANOVA showed there were no significant changes in BES score over time, and there were no significant changes in BES score over time by intervention group assignment. However, there was a significant change in BES score over time by binge eating status ($F(1,164)=33.253$, $p<.001$); binge eaters decreased their BES score greater than non-binge eaters as a result of participating in a lifestyle intervention, regardless of intervention group assignment. Repeated measures ANCOVA ANOVA demonstrated a significant three-way interaction between changes in BES score, intervention group and binge eating status ($F(1,157)=5.170$, $p=.024$), adjusted for income, BMI and dietary habits at T1. Women who were classified as binge eaters and participated in the physical activity intervention reported greater decreases in BES score than non-binge eaters in the dietary habits intervention group, after adjusting for covariates. These significant repeated measures interaction results are depicted in **Figures 1 and 2**.

Discussion

This study explored whether a lifestyle intervention was a feasible way to reduce binge eating symptoms in African American and Hispanic women and whether changes in binge eating symptoms would differ by intervention group (physical activity versus dietary habits) and binge eating status at baseline (non-binge eater versus binge eater). We found a three-way interaction indicating that binge eaters in the physical activity group experienced greater decreases in binge eating symptoms than women in the dietary habits group, and nearly 20% of women in the physical activity group were classified as non-binge eaters post-intervention who were classified as binge eaters at baseline, suggesting that exercise

may be a more effective target than dietary habits in future intervention studies demonstrating a promising direction for intervention. This study highlights the high prevalence of binge eating symptoms in a non-treatment seeking sample and is among the first to suggest that lifestyle interventions focused on improving physical activity may be an accessible strategy that is useful for reducing binge eating scores symptoms and preventing addressing binge eating disorder in ethnic minority women. Overall, changes in fruit and vegetable intake translated to a 14% increase in the daily recommended number of servings ($d=-0.2$) and a reduction in fat intake of 24 kcal ($d=0.4$). Thus, at T2, participants were eating 74% of the daily recommended number of servings of fruits and vegetables and were just shy of meeting current recommendations for dietary fat intake (30% of daily energy). Results also suggested that HIP participants who were binge eaters benefited the most more than non-binge eaters from participation in a lifestyle intervention, regardless of group assignment. Binge eaters saw greater decreases in binge eating symptoms, leading to the reclassification of a large proportion of binge eaters as non-binge eaters. These results suggest that the positive effects of the interventions may have been independent of small dietary changes, and that it is more likely that these interventions influence other cognitive or psychological aspects of eating behavior not directly assessed as part of this study.

Results from the current study support previous research showing long-term BED treatment success in binge eaters using a traditional weight loss program that instructed participants to improve dietary habits and increase physical activity without targeting binge eating symptomology (Munsch, Meyer, & Biedert, 2012). Findings from this study go beyond the existing literature and contribute to our understanding of the usefulness of lifestyle interventions, including physical activity interventions, to reduce binge eating symptoms among African American and Hispanic women classified as binge eaters and at greatest risk for developing BED. Previous research has suggested that binge eating and overeating may be related to maladaptive coping to stressors (Stice & Presnell, 2010). Since physical activity is a known behavioral strategy to reduce stress and improve mood (Childs & de Wit, 2014; Dinas, Koutedakis, & Flouris, 2011; Goodwin, 2003), previous findings coupled with the current study findings suggest one mechanism through which physical activity may reduce binge eating symptoms. Additional work is needed to explore these mechanisms and the combined effects of a dietary habits and physical activity intervention for reducing binge eating symptoms in non-treatment seeking, ethnic minority populations in an effort to identify sustainable strategies for BED prevention in vulnerable populations at greater risk for obesity and related chronic diseases.

Strengths of this study include a sizable sample of African American and Hispanic women who have been understudied in the binge eating literature. Participants were also older than most previously reported samples, broadening our understanding of binge eating symptoms in mature ethnic minority women. Another strength of this study was the use of a non-treatment seeking community sample. Most of the studies that document BED and sub-threshold BED are in treatment-seeking samples and conducted prior to weight loss surgery (Alger-Mayer, Rosati, Polimeni, & Malone, 2009; Azarbad, Corsica, Hall, & Hood, 2010; Bocchieri-Ricciardi et al., 2006). However, not everyone seeks or is a candidate for surgical weight loss. Therefore, the prevalence of BED and sub-threshold BED among African

American and Hispanic women may be misrepresented in the literature. In addition, previous research has tended to focus on the types of food consumed during binges, as opposed to routine dietary habits (Lourenco et al., 2008; Raymond, Neumeyer, Warren, Lee, & Peterson, 2003; Reeves et al., 2001; Rossiter, Agras, Telch, & Bruce, 1992). This study took into consideration routine dietary habits, including vegetable and fruit and dietary fat intake, in order to accurately evaluate the effectiveness of a lifestyle intervention on binge eating symptoms.

Although unique, this study is not without limitations. Although repeated measures results indicated that changes in BES score over time differed between women in the physical activity versus intervention group and between non-binge eaters and binge eaters after controlling for significant covariates, including dietary habits, we cannot definitively state whether changes in fruit and vegetable or dietary fat intake led to the reductions in BES scores or whether reductions were due to increased awareness of healthy dietary habits as a result of participating in the intervention. Due to large attrition rates, analyses were limited to those who completed the BES at baseline and post-intervention. Therefore, we are unable to report on true retention of binge eaters in this study. However, the attrition rates observed are on par with those observed in similar studies with ethnic minority women (Chen et al., 1998; Grossi et al., 2006) and suggest the need to address personal and contextual factors along with study-related barriers to enhance retention of ethnic minorities in population research studies (Ashing-Giwa & Rosales, 2012; Brown, Fouad, Basen-Engquist, & Tortolero-Luna, 2000). The current study sample included women of relatively higher socioeconomic status and should be generalized to other populations, such as low-income minorities or men, with caution. Another study limitation may be the use of self-report measures for fruit and vegetable and dietary fat intake and binge eating symptoms, which are susceptible to response bias. The BES is designed as a screening instrument, which may be more commonly used in community settings, rather than a tool or process that provides a diagnosis of BED or sub-threshold BED. This may limit comparability with other studies that used a diagnostic tool. Finally, this study did not look at the association between the maintenance of lifestyle changes, like improved physical activity and dietary habits, and changes in binge eating symptoms. Future research is needed to explore the long-term effects of a lifestyle intervention on binge eating symptoms and the subsequent development of binge eating disorder in community-based samples.

Conclusions

Results suggest relatively high rates of binge eating symptoms in a community-based sample of overweight and obese, middle-aged African American and Hispanic women. Lifestyle behavioral interventions may lead to reductions in binge eating symptoms among ethnic minority binge eaters, and interventions focused on increasing physical activity may lead to greater reductions in BES scores. Further work is needed to understand the underlying mechanisms driving improvements in binge eating symptoms and the pivotal role routine dietary habits play in BED. Future studies should determine how self-esteem, reductions in negative affect and cultural factors in combination with improved dietary habits may further reduce binge eating symptoms in African American and Hispanic women.

Acknowledgements

Dr. Scherezade Mama was supported by a cancer prevention fellowship through The University of Texas MD Anderson Cancer Center, Cancer Prevention Research Training Program, funded by the National Cancer Institute (R25T CA057730, PI: Chang; P30 CA016672, PI: DePinho). Funding for the HIP study and this research was provided by a grant awarded to Dr. Rebecca Lee by the National Institutes of Health's National Cancer Institute (R01 CA109403).

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Highlights

- The prevalence of binge eating in non-treatment seeking minority women is high.
- Bingers in the physical activity intervention reduced their binge eating symptoms.
- Lifestyle interventions may be effective for reducing binge eating symptoms.

Figure 1. Change in BES score over time by binge eating status (two-way interaction)

This figure depicts a significant time*binge eating status two-way interaction ($F(1,164)=33.253, p<.001$). Women classified as non-binge eaters at baseline reported no change in binge eating symptoms (BES Score) from baseline to post-intervention ($\Delta=-0.5, d=0.1$), whereas women classified as binge eaters reported significant decreases in BES Score ($\Delta=-5.7, d=1.1$).

Figure 2. Change in BES score over time by intervention group and binge eating status (three-way interaction)

This figure depicts a significant time*intervention group*binge eating status three-way interaction ($F(1,157)=5.170$, $p=.024$). Women randomized to the physical activity group and classified as non-binge eaters at baseline reported no change in binge eating symptoms (BES Score) from baseline to post-intervention ($\Delta=-0.7$, $d=0.1$), and women randomized to the dietary habits group and classified as non-binge eaters at baseline reported no change in BES Score from baseline to post-intervention ($\Delta=-0.3$, $d=0.1$). In contrast, women randomized to either the physical activity or dietary habits groups and classified as binge eaters at baseline reported significant decreases in BES Score from baseline to post-intervention. Moreover, among women classified as binge eaters, women in the physical activity group reported greater decreases in BES Score ($\Delta=-6.2$, $d=1.3$) than women in the dietary habits group ($\Delta=-4.4$, $d=0.7$).

Table 1Participant ($N=180$) demographics, dietary habits and binge eating symptoms by ethnicity

	T1 <i>M (SD)</i>	T2 <i>M (SD)</i>
BMI (kg/m ²)	34.7 (8.0)	34.4 (8.0)
Body fat (%)	42.8 (7.0)	42.5 (7.1)
Fruit and vegetables (servings/day) ^a	3.0 (3.0)	3.7 (2.8)
Daily energy from dietary fat (%) ^a	31.8 (3.7)	30.3 (3.5)
Binge eating symptoms ^a	13.0 (8.0)	11.1 (7.4)

^aSignificantly different by time point, $p<.01$.