

MEAL PATTERNS, BINGE EATING, AND BMI AMONG LATINAS

by

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ABSTRACT

COLLEEN ANGELA THOMAS. Meal patterns, binge eating, and BMI in Latinas.
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The underrepresentation of ethnically diverse women in the binge eating literature contributes to the false assumption that eating disorders are less prevalent among these women. This thesis represents the first known study examining a sample of exclusively Latina women who binge eat. The study had two aims: (1) to describe the eating patterns of Latinas who binge eat and examine the associations between these patterns and binges and BMI, and (2) to determine whether a CBT guided self-help (gsh) treatment modifies eating patterns that can be associated with reductions in binges and BMI. Participants for aim 1 included 64 Latina women diagnosed with bulimia nervosa or binge eating disorder using the Eating Disorder Examination (Fairburn & Cooper, 1993), and aim 2 included the 24 women who completed CBTgsh. Baseline data indicated that binge eating was positively correlated with BMI and that breakfast was the least and dinner the most consumed meal. Lunch consumption was positively associated with binge eating and evening snack consumption was negatively associated with BMI ($p < .05$). The analysis of pre- to post- treatment variables indicated significant decreases in binge eating and BMI. Multiple regression analyses showed that changes in mid-afternoon snack frequency significantly predicted changes in binge days, such that increases in mid-afternoon snacks predicted reduction in binge days. While this study yielded preliminary evidence for the effectiveness of changing meal patterns and CBTgsh for reducing binge eating among Latinas, more research using diverse populations is needed to develop this limited literature and provide culturally competent treatments for binge eating.

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INTRODUCTION

The DSM-V outlines the criteria for several eating disorders including anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). Current research has identified BED as the most prevalent of these eating disorders among Latinos (Alegria, Woo, Cao, Torres, Meng, & Striegel-Moore, 2007). BED was first included as a new preliminary diagnostic category, under Eating Disorder Not Otherwise Specified, in the DSM-IV in 1994 (American Psychiatric Association APA, 1994). Since then, researchers have studied the eating behaviors and clinical features of individuals with BED to determine how BED may be different from other eating disorder categories. In 2013, the fifth edition of the DSM identified BED as its own distinct eating disorder, characterized by recurring binge episodes (at least once per week for three months) that are accompanied by a loss of control. A binge episode is defined as a discrete period of time (within any two-hour period) during which the amount of food consumed is considerably larger than what most people would eat in a similar period of time under similar circumstances (APA, 2013). A diagnosis of BED also requires that binge eating causes distress to the individual. It is not uncommon for feelings of shame, guilt, and depression to be associated with this distress.

Although recent research has suggested otherwise, the traditional underrepresentation of minority women in clinical studies for eating disorders has contributed to the false belief that eating disorders are less common in ethnic minority groups. However, a study of a community sample of Latina, African American, Asian, and White women indicated that eating disorders were equally prevalent among these women (Cachelin, Veisel, Barzegarnazari, & Striegel-Moore, 2000). Specifically

regarding binge eating, Latina and African American women may actually report a greater severity of binge eating symptoms as compared to White women (Fitzgibbon, Spring, Avellone, Blackman, Pingitore, & Stolley, 1998).

While recurrent binge eating is a primary criterion for both BN and BED, it is also sometimes associated with chronic conditions such as obesity and diabetes. Although correlations between binge eating and obesity appear complicated and unclear, research has shown that obese patients with BED have a higher BMI than obese patients without BED (Ricca et al., 2001). Similarly, research findings have demonstrated wide variation regarding the prevalence of binge eating among individuals with diabetes, but one study suggested that the prevalence rate could be as high as 25.6% (Allison et al., 2007; Crow, Kendall, Praus, & Thuras, 2001). Although the research between binge eating and obesity and diabetes remains controversial, it is not a link that should be ignored. This is especially true for Latinos, the nation's largest ethnic minority (U.S. Census Bureau, 2014), because diabetes and obesity are more prominent among Latinos as compared to non-Latino Whites. For example, among ethnic groups in the United States, only non-Latino African Americans (13.2%) have a higher prevalence of diabetes than Latinos (12.2%) (National Center for Health Statistics, 2014). Similarly, Latinos have the second highest age-adjusted rate of obesity, as 42.5% of Latinos are estimated to be obese compared to only 32.6% of non-Latino Whites (Ogden, Carroll, Kit, & Flegal, 2014).

Chronic health conditions, such as obesity and diabetes, should warrant serious health concern because they comprised seven of the United States' top 10 causes of death in 2010 (CDC, 2014a). Despite the fact that chronic health conditions are some of the most common and costly of all health concerns, they are often preventable (CDC, 2014a).

Access to affordable, high-quality health care is a preventative strategy to safeguard against chronic conditions and disease, yet it is estimated that almost one-third (30.4%) of Latino Americans under age 65 do not have health insurance coverage (CDC, 2014b; NCLR, 2014). Making matters worse, Latinos are nearly twice as likely to lack a regular source of health care as compared to non-Latino Whites, which means that many Latinos are not receiving the preventative screenings and services that could potentially treat or minimize the effects of possible chronic health conditions (National Center for Health Statistics, 2014). Without these regular health care visits, it is possible that chronic health conditions are going undiagnosed among many Latinos, meaning that their rates of chronic health conditions like obesity and diabetes could be much higher than current data suggests. Thus, the already high (and possibly underreported) prevalence of obesity and diabetes among Latinos combined with their decreased treatment seeking is a serious concern that could be contributing to the perpetuation of unhealthy and potentially fatal lifestyle habits. Even further complicating this issue, treatment-seeking behaviors for eating disorders like binge eating may be also particularly low among Latinos. For example, one study found that treatment seeking among an ethnically diverse sample of women with eating disorders was actually linked to greater distress about their binge eating and an earlier onset age of eating problems (Cachelin, Rebeck, Veisel, & Striegel-Moore, 2001). Therefore, Latina women and other ethnically diverse women may be deterred from seeking formal treatment for eating concerns.

Thus far, several established treatments for binge eating and BED, both psychotherapies and pharmacotherapies, have yielded positive results. Of these treatments, cognitive-behavioral therapy is the best-established, efficacious intervention,

as evidenced by maintained treatment effects after 12 months (Carter & Fairburn, 1998; Grilo, Masheb, Wilson, Gueorguieva, & White, 2011; Grilo, Crosby, Wilson, & Masheb, 2012). Establishing a regular pattern of eating, such that daily eating is confined to three planned meals and two or three planned snacks is a core element of CBT treatment for binge eating (Fairburn, Marcus, & Wilson, 1993; Fairburn, 1995). The implementation of this pattern of eating is designed to change irregular, erratic eating patterns that often facilitate and maintain the restrict/binge cycle characteristic of binge eaters. Research has demonstrated that eating at least three meals per day is associated with significantly fewer objective bulimic days and episodes as compared to eating less than three meals per day (Masheb & Grilo, 2006; Masheb, Grilo, & White, 2010). Furthermore, regular consumption of breakfast, lunch, and dinner was also significantly correlated with lower BMI among patients with BED (Masheb & Grilo, 2006). These data provide preliminary evidence for the utility of establishing a regular pattern of eating, but more experimental designs, especially those that include ethnically diverse populations, are warranted to determine the effectiveness of CBT for reducing binges.

Despite promising research thus far, some critical gaps still exist in the BED treatment literature. First, treatments for BED have failed to demonstrate clinically meaningful weight-loss. It is possible that this lack of significant weight-loss could be attributed to most treatments' focus on eating regularity rather than weight-loss. Nonetheless, weight-loss remains a salient and necessary treatment goal because of the increased risk for morbidity and mortality associated with obesity among individuals with BED (NTF, 2000). Furthermore, weight-loss would specifically be a critical goal for Latinas who have a higher prevalence of obesity than White women. The second gap in

the literature regards the uncertainty about which specific binge eating treatment mechanisms are actually linked to binge remission and reduction in eating disorder (Masheb & Grilo, 2006). Relatively little is known about which factors may predict or contribute to binge remission in individuals with BED; thus, research that can specifically identify and elucidate these prominent treatment factors could have particularly meaningful implications for informing future treatment for individuals who binge eat. Lastly, although eating disorders appear to be at least equally prevalent across ethnic groups, it is evident that treatment-seeking behaviors are not. More recently, self-help and guided self-help interventions are being tested as an alternative, cost-effective method to conventional medical or psychological services for BED (Grilo & Masheb, 2005; Pratt, Halliday, & Maxwell, 2009). As the advancement of this field of research progresses, it would be important to determine whether a guided self-help intervention for binge eating could serve as an effective first line of treatment for Latina women. Not only would guided self-help offer a more affordable treatment alternative, it might also serve as a more accessible form of treatment for Latinas who may be less inclined to seek conventional services.

Although little research has focused specifically on Latina women with BED, the research on predominantly White individuals with BED has yielded some particularly important findings related to meal patterns and BED outcomes. First, studies found that more frequent evening snacking among individuals with BED was significantly correlated with increased binge eating (Harvey, Rosselli, Wilson, DeBar, & Striegel-Moore, 2011; Masheb & Grilo, 2006). Although these data seem to contradict the finding that more frequent meals and snacks were related to lower weight (Masheb & Grilo,

2006), some researchers speculate that the evening may be a particularly vulnerable time for binge eating, thus explaining why evening snack frequency has been found to be positively correlated with binge episodes in at least one study (Harvey et al., 2011). Secondly, the frequency of breakfast consumption alone has been associated with a lower BMI (Barton et al., 2005; Masheb & Grilo, 2006) and decreased impulsive snacking among individuals with BED (Schlundt et al., 1992).

This finding that breakfast is correlated with a healthier weight may not be surprising, as research has suggested that breakfast is part of a healthier diet across all ages. Breakfast is also considered to be an integral component of a healthy lifestyle; research suggests that skipping breakfast is associated with unhealthy behaviors among adults such as increased smoking and decreased exercise (Keski-Rahkonen, Kaprio, Rissanen, Virkkunen & Rose, 2002). Furthermore, research indicates that consuming breakfast has a positive influence on weight management, mood, and cognitive functioning (Widenhorn-Müller, Kille, Klenk & Weiland, 2008; Wyatt, Grunwald, Mosca, Klem, Wing & Hill, 2002).

Despite the ample research supporting the important role of breakfast on one's overall health, there is very little research, if any, that examines whether breakfast promotes a regular pattern of eating, one of the core treatment components for BED. Furthermore, no significant negative correlations between breakfast consumption and binge eating have been found in the BED literature (Harvey et al., 2011; Masheb & Grilo, 2006; Masheb, et al., 2010), even though this association would be reasonably expected based on the importance of breakfast to health. This failed expectation prompts the question: "If breakfast is an integral component to a healthy diet and lifestyle, should it

not correlate with decreased binges?” This question is one of several that are left unanswered by this growing literature and one that requires further exploration. If research can determine that breakfast is either associated with a regular pattern of eating, which in turn is suggested to protect against binge eating (Fairburn, 1995), or is directly associated with binges, it could provide extremely meaningful information for the treatment of binge eating.

Purpose

It is not only necessary to learn more about binge eating within Latina women, but it is also imperative to elucidate effective treatment components for reducing binges and lowering BMI. Thus, the purpose of this study is two-fold. Aim 1 is to describe the eating patterns of Latinas who binge eat and then examine the associations between these patterns and binge episodes and BMI. Less is known about eating disorders among Latinas due to their underrepresentation in the current literature, therefore examining their eating patterns will help determine if Latina women differ from the research samples of predominantly White women with BED. It is expected that Latina women with BED will exhibit similar patterns of eating pathology as compared to White women with BED, such that (1) combined meal frequency would be negatively correlated with binge episodes and BMI, (2) breakfast frequency would be negatively associated with BMI, and (3) evening snack frequency would be positively correlated with binge episodes (Harvey et al., 2011; Masheb & Grilo, 2006; Masheb et al., 2011). Although significant correlations have yet to be found in the research, it is also hypothesized that there would be a negative association between breakfast frequency and binge episodes due to the previous discussion regarding breakfast's role in overall health. Therefore, aim

1 offers a descriptive picture of an exclusively Latina population who binge eats in order to learn more about how this sample compares to previous research about individuals with binge eating disorder.

Aim 2 attempts to shed light on a separate gap in the eating disorder literature. Thus far, research has failed to identify which treatment components of CBT, or CBTgsh, for BED are most salient and effective. Therefore, the second aim of this study was to determine whether CBTgsh treatment results in changes in eating patterns and to then examine whether these changes, such as an increase in breakfast consumption or combined meal frequency, were associated with reductions in binge episodes and decreased BMI. The research hypotheses were that CBTgsh will affect participants' eating patterns and that participants who reported increased breakfast frequency and combined meal frequency at the conclusion of the 12-week CBTgsh treatment would achieve greater reductions in binge episodes and have a lower BMI. Determining whether these associations exist between post-treatment data of eating patterns, binge episodes and BMI could help inform future treatment for binge eating. For example, if increased breakfast frequency is indicated to be a salient treatment component for binge reduction, binge eating treatments could place particular emphasis on breakfast consumption. Thus, aim 2 could have meaningful implications for possible modifications to binge eating treatments and interventions.

METHODS

This dataset uses both primary data collected in Charlotte and secondary data from the study *Test of a Self-Help Program to Treat Overeating and Obesity in Latinas*, which was conducted in Los Angeles.

Participants were 64 women recruited from the community. These participants responded to flyers and advertisements posted at educational institutions, medical clinics, and community buildings throughout the greater Charlotte and Los Angeles areas. The flyer sought women of Latina origin who were experiencing problems with overeating or bingeing and who were interested in participating in a women's health study.

Respondents were screened for eligibility during a brief phone call. Inclusion criteria required participants to be female, ages 18-55 years old, of Latina origin, to have a BMI ≥ 18 , and to self-report regular (at least once per week) binge eating. Exclusion criteria consisted of: current treatment for an eating disorder, brain injury or impairment that affected recall or ability to complete assessments, serious medical condition or medical risk that would require immediate hospitalization, or current pregnancy. Eligible respondents were then administered the Eating Disorder Examination (EDE), described below, over the phone by trained graduate-level members of the research team.

Measures

Demographics: Self-reported demographic information was collected from each respondent.

Body Mass Index (BMI): At the onset of the intervention, self-reported height and weight measures were collected from each participant, irrespective of condition, in order to calculate her baseline BMI. Participants' BMI was calculated using the formula:

weight in kilograms / height² in meters. Baseline BMI measures ranged from 20.8 to 57.3 ($M= 32.7$, $SD = 8.0$) for the 64 respondents.

Binge eating symptoms: The EDE 12th Edition (Fairburn & Cooper, 1993) is a well-established, investigator-based interview that assesses eating patterns, eating behaviors, and eating disorder features such as extreme concerns about one's shape and weight (Masheb & Grilo, 2006). Respondents self-report the frequency of their meals, snacks, binges and compensatory behaviors as well as reporting the severity of any eating-related distress or feelings of loss of control. Information regarding one's eating patterns was collected with a predominant focus on the previous 28 days. For example, participants were asked questions beginning with, "On how many days out of the past 28 days have you eaten..." and ending with: breakfast, mid-morning snack, lunch, mid-afternoon snack, evening meal, evening snack, and nocturnal eating. The EDE interviewer also collects information regarding the frequency of binges during the past 28 days. Special attention was given to classifying the different types of eating into specific categories including "objective binge episode (OBE)" and "objective overeating (OO)". Both of these categories were defined as a discrete period of time (within any two-hour period) during which the amount of food consumed was considerably larger than what most people would eat in a similar period of time under similar circumstances. However, an OBE must also be accompanied by feelings of 'loss of control' whereas an OO lacks that criterion requirement. To calculate the frequencies of OBE's and OO's, the interviewer asks the participant how many times in the past 28 days she experienced these two types of eating, respectively. Studies have demonstrated good inter-rater and test-retest reliability for the EDE's assessment of binge eating behaviors and eating

disorder features (Grilo, Lozano, & Elder, 2005). The EDE and its subscales have also been shown to have high discriminant and concurrent validity (Cooper, Cooper, & Fairburn, 1989). The sound psychometric properties of the EDE explain why it is widely used and considered to be the “gold standard” for the assessment of eating disorders (Guest, 2000).

Procedures

Upon completion of the EDE phone interview, all respondents were compensated \$25 for their time and participation. Then, respondents who met criteria for a current DSM-V diagnosis of BED or BN, according to the EDE, were invited to participate in the intervention, which included a 12-week cognitive-behavioral therapy guided self-help (CBTgsh) program.

This study was approved by the IRB at California State University, Los Angeles and at the University of North Carolina at Charlotte, and informed consent was obtained from all participants prior to participating in the EDE phone interview. A second consent was collected from participants assigned to the CBTgsh treatment condition. American Psychological Association (APA) and IRB requirements for the ethical treatment of human subjects in research were followed.

CBTgsh Treatment

Participants assigned to the CBTgsh condition were provided a copy of *Overcoming Binge Eating* (Fairburn, 1995), a self-help manual aimed at helping individuals establish a regular pattern of eating in an effort to reduce binge episodes. Each participant in the CBTgsh treatment condition was also assigned a non-specialist supporter who guided the participant through the 12-week intervention, using the

treatment manual, via eight phone sessions lasting no more than 25 minutes each. Prior research (Grilo & Masheb, 2005; Wells, Garvin, Dohm, & Striegel-Moore, 1997) has demonstrated the effectiveness of using this manual, with the guidance of a supporter, to markedly decrease the frequency of binge eating.

The treatment program and phone sessions followed the supporter manual developed by Fairburn (Fairburn, 1998), which outlines the elements of each phone session in addition to providing instructions for how the supporter should prepare for sessions. The manual also stipulates that the phone sessions occur weekly during the initial four weeks and bi-weekly during the remaining eight weeks. The primary role of the supporter is to guide the participant's progress through the six steps of the self-help manual, which include monitoring one's food intake, establishing a regular pattern of eating, and building a list of alternative activities to use during moments when the participant feels tempted to binge. The supporter encourages the participants as they work to implement these steps and also helps to explain the rationale for utilizing such a manual for the reduction of binge eating. Participants assigned to the CBTgsh treatment condition were compensated \$25 at the outset of the treatment and \$25 upon their completion of the 12-week intervention.

At the end of each 12-week condition, either CBTgsh treatment or waitlist, the participant was again administered the EDE and her height and weight were recorded. For the purposes of this study, only post-intervention data for the 24 participants in the CBTgsh treatment group are examined to address Aim 2.

Analyses

Aim 1: to describe the eating patterns of Latinas who binge eat and then examine any associations between these patterns and binge episodes and BMI. To address aim 1, we followed the methodology of Masheb and Grilo (2006). Descriptive data were compiled using baseline measures of meal and snack frequencies, binge episodes, and BMI for the total sample of participants ($N = 64$). Then, Pearson correlation analyses were conducted to examine the associations between the participants' baseline data including: (1) combined meal frequency with OBE frequency and BMI, and (2) breakfast frequency with OBE frequency and BMI. We tested for similar associations between breakfast, combined meal, and OO frequency as well. It was expected that these OO correlations would closely match the OBE correlations due to the similarity in their definitions; both OBE's and OO's share the diagnostic criterion of consuming large amounts of food. We hypothesized that Latina participants would exhibit similar patterns of eating pathology as compared to White women with BED, such that (1) combined meal frequency would be negatively correlated with binge episodes and BMI, and (2) breakfast frequency would be negatively correlated with BMI. Again, although significant correlations had not yet been found in the research, a negative association between breakfast frequency and binge episodes was also expected.

Aim 2: to determine whether CBTgsh treatment modifies eating patterns and to then examine whether these changes, such as increases in breakfast consumption and combined meal frequency, were associated with reductions in binge episodes and decreased BMI. To examine aim 2, we used repeated measures MANOVA to test for mean differences between pre- and post- measures of meal and snack frequencies, OBE

days, OO days, and BMI, for the participants who completed the CBTgsh treatment condition ($n = 24$). By comparing their baseline data to their post-treatment data, we assessed whether our variables of interest (OBE frequency, OO frequency, BMI) were affected by treatment. Then, multiple regression analyses were performed to determine whether success in the program, operationally defined by decreases in BMI, OBE's, and OO's post-treatment, was predicted by pre- to post- changes in meal and snack frequencies. The research hypotheses were that CBTgsh would significantly affect participants' eating patterns and that participants who report increased breakfast frequency and combined meal frequency at the conclusion of the 12-week CBTgsh treatment would achieve greater reductions in binge episodes and have a lower BMI.

RESULTS

Respondents were 64 women ages 18-53 years old ($M= 28.3$, $SD = 7.6$), 70.3% ($n = 45$) were single while 23.4% ($n = 15$) were married, and 34.4% ($n = 22$) had at least one child. Approximately 82.9% of the women ($n = 53$) reported having at least some college education. Of these respondents, the women who were interested in the intervention were randomly assigned to either the treatment condition, which included a 12-week cognitive-behavioral therapy guided self-help (CBTgsh) program, or a wait-list condition during which no treatment was offered for 12 weeks.

Aim 1

Table 1 shows the frequency of meals and snacks consumed in the past 28 days for all 64 participants diagnosed with BED or BN during their EDE phone interview. Breakfast was the least consumed meal, with less than one-fourth ($n = 14$; 21.9%) of the sample reporting having eaten breakfast every morning during the past 28 days. Daily lunch ($n = 22$; 34.4%) was consumed more than breakfast, but dinner was the most frequently consumed meal ($n = 27$; 42.2%). Almost half of the participants reported eating dinner daily. Although none of the women reported skipping lunch or dinner every day, a few women ($n = 2$; 3.1%) reported skipping breakfast everyday. Daily mid-afternoon snacks ($n = 8$; 12.5%) were more likely to be consumed than mid-morning snacks ($n = 5$; 7.8%). However, daily evening snacks ($n = 10$; 15.6%) were the most commonly consumed snack among this sample. Additionally, more than 68% of the women reported having an evening snack at least half of the past 28 days. Nearly half of the women ($n = 31$; 48.8%) reported never having nocturnal snacks, but a small portion of women ($n = 4$; 6.3%) reported nightly episodes of nocturnal eating.

Table 2 shows the Pearson correlations between each of the meals and snacks, nocturnal eating, the combined meal and combined snack frequencies, BMI, and binge eating for the 64 women at baseline ($N = 64$). BMI was significantly and positively correlated with OBE days ($r = .31, p = .013$) such that women with a higher BMI reported more frequent days during which they ate an unusually large amount of food and felt an accompanying loss of control. Among the meals, lunch was significantly and positively related to OBE days ($r = .26, p = .037$), meaning that eating lunch was associated with more frequent binge eating days. Among the snacks, only the evening snack yielded significant correlations; the frequency of evening snacking was negatively correlated with BMI ($r = -.26, p = .041$) such that more frequent evening snacking was associated with lower weight.

Despite our research hypothesis regarding the possible importance of breakfast in protecting against erratic eating patterns and binge eating, neither the breakfast nor dinner frequencies were significantly correlated with binge eating (i.e., OBE days and episodes and OO days and episodes) or BMI. Similarly, mid-morning and mid-afternoon snacking and nocturnal eating had no significant associations with the outcome variables. All three meals combined (i.e., the total frequency of breakfast, lunch, and dinner during the past 28 days) and all three snacks combined (i.e., the total frequency of mid-morning, mid-afternoon, and evening snacks during the past 28 days) also yielded no significant correlations at baseline. It is possible that that some of our nonsignificant results may be due to lack of power, and therefore findings should be viewed with caution and only as exploratory at this stage. More research with larger samples is needed to corroborate our data.

Aim 2

To examine the impact of treatment for the participants who completed CBTgsh ($n = 24$), we used repeated measures MANOVA to examine the mean differences between pre- and post- measures of meal and snack frequencies, OBE days, OO days, and BMI. One participant was missing data for her post BMI measure and was removed from this analysis; therefore, the MANOVA was conducted using 23 participants who completed CBTgsh. Overall, there was a statistically significant difference between these participants' measures from baseline to post-treatment, ($F(9,14) = 8.43, p < .001$, Pillai's Trace = .84). The univariate F tests showed significant differences in OBE days ($F(1) = 47.13, p < .001$) and BMI ($F(1) = 6.72, p = .017$). These results demonstrate that OBE days significantly decreased from baseline ($M = 11.35, SD = 6.44$) to post-treatment ($M = 1.30, SD = 2.64$). In the same way, BMI significantly decreased from baseline ($M = 33.67, SD = 7.87$) to post-treatment ($M = 32.52, SD = 7.91$). These reductions in both OBE days and BMI represent favorable treatment outcomes and provide preliminary evidence for the effectiveness of CBTgsh among Latinas who binge eat. The results however did not indicate significant changes in either breakfast ($F(1) = 3.85, p = .062$) or combined meal frequency ($F(1) = 4.13, p = .054$), the two meal frequency variables related to our research hypotheses. Additionally, significant differences for OO days ($F(1) = 4.04, p = .057$) were not found. It is possible that a larger sample yielding more statistical power would produce statistically significant mean differences in breakfast and combined meal frequency and OO days since these variables are already nearing significance in our modest sample.

To further examine the findings from the repeated measures MANOVA, regression analyses were conducted with the same sample ($n = 24$) to determine whether the changes in OBE days, OO days, or BMI could be reliably explained by the participants' pre- to post- changes in their meal and snack frequencies. Due to our small sample size, each predictor was individually entered and tested in single-predictor models. For example, change in breakfast frequency alone was tested as a predictor of changes in OBE days, OO days, and BMI, respectively. This approach allowed us to compare across the single-predictor models in order to determine which predictors were best accounting for change in the outcome variables of interest.

None of the single-predictor models yielded significant results for either the changes in OO days or BMI. Therefore, the final six-predictor models (including changes in breakfast, mid-morning snack, lunch, mid-afternoon snack, dinner, and evening snack frequencies) for both OO days ($F(6, 17) = 1.02, p = .445, \text{adjusted } R^2 = .005$) and BMI were also not significant ($F(6, 16) = .18, p = .978, \text{adjusted } R^2 = -.29$). However, there were significant findings for predicting changes in OBE days. Specifically, the single-predictor model using change in mid-afternoon snack frequency yielded significant results ($F(1, 22) = 10.06, p = .004, \text{adjusted } R^2 = .28$); the change in mid-afternoon snack frequency accounted for 28% of the variance in change in OBE days. This mid-afternoon snack predictor model ($B = -.53, \beta = -.56, t = -3.17, p = .004$) suggests that we could expect a decrease of .53 OBE days for every one-day increase in mid-afternoon snack frequency. Thus, pre- to post- increases in mid-afternoon snack frequency reliably explained pre- to post- decreases in OBE days. Conversely, change in breakfast ($t = .371,$

$p = .715$) was not a significant predictor of participants' change in OBE days or any other outcome variable, despite our original research hypothesis.

We did not originally anticipate that the frequency of any snack would be a reliable predictor of reductions in our outcome variables. However, since the data indicated that increases in the frequency of mid-afternoon snack reliably explained reduction in OBE days better than any other change in meal or snack frequencies, we chose to run post-hoc analyses to further explore the impact of mid-afternoon snack consumption on their binge eating. Only the participants ($n = 24$) who completed CBTgsh were included in this analysis. We conducted an ANOVA in order to compare group mean changes in OBE days, OO days, and BMI between the participants who increased their mid-afternoon snack frequency and those who decreased or did not change it from pre- to post- treatment. The results, shown in Table 3, demonstrate that the participants who increased their mid-afternoon snacks also had significantly greater reduction in OBE days ($M = -13.75$, $SD = 7.29$) than participants who decreased or did not change their total snack frequency ($M = -7.81$, $SD = 6.10$) from pre- to post-treatment ($F(1, 22) = 4.45$, $p = .047$). This ANOVA further corroborates the significance of the relationship between mid-afternoon snack and OBE days for this sample of Latina women. There were not statistically significant group mean differences for either OO days or BMI. Thus, this ANOVA suggests that increasing mid-afternoon snacks was significantly related to a greater reduction in OBE days from pre- to post- treatment.

Table 2: Correlation coefficients for the eating pattern variables with OBE days, OO days, and BMI at baseline for the total sample ($N = 64$)

Measures	BMI	Meals		Snacks		Mid-morning		Mid-afternoon		Evening snack
		Combined	Combined	Breakfast	morning snack	Lunch	afternoon snack	Dinner		
Objective bulimic (OBE) days	.31*	.22	.07	.15	.13	.26*	.08	.11	-.02	
Objective overeating (OO) days	-.14	-.02	.06	-.05	.08	.03	-.02	-.02	.07	
BMI		.12	-.21	.05	-.07	.20	-.16	.05	-.26*	

Note: BMI= body mass index; Meals Combined = frequency of breakfast, lunch, and dinner in the past 28 days; Snacks Combined = frequency of mid-morning snacks, mid-afternoon snacks, and evening snacks in the past 28 days.

* $p < .05$.

Table 3: Means, standard deviation, and ANOVA for changes in OBE days, OO days, and BMI for participants who increased vs. decreased or did not change mid-afternoon snack frequency

Changes in outcome variables	Participants who increased mid-afternoon snack frequency (n = 8)		Participants who decreased or did not change mid-afternoon snack frequency (n = 16, 15 ^b)		ANOVA
	M	SD	M	SD	
Change in OBE days (n = 24)	-9.79	6.97	-13.75	7.29	4.45 df = (1, 22)
Change in OO days (n = 24)	-1.58	3.43	-1.75	3.65	.03 df = (1, 22)
Change in BMI (n = 23) ^a	-1.15	2.13	-.50	1.07	1.16 df = (1, 21)

Note: OBE= objective bulimic episode; OO = Objective overeating; BMI= body mass index; CSF (Combined Snack Frequency) = frequency of mid-morning, mid-afternoon, and evening snacks in the past 28 days.

^a One participant was missing data for post-BMI so this particular analysis was conducted with 23 participants.

^b Sample size used for change in BMI in this group

* $p < .05$.

DISCUSSION

The analyses for Aim 1 presented important research findings that represent the first known descriptive picture of an exclusively Latina group of women who binge eat. We expected that these Latina women would report similar patterns of eating pathology as compared to research samples of predominantly White women. However, that hypothesis was not entirely supported. Our finding that the frequency of evening snacking correlated with lower BMI matched the findings of the Masheb and Grilo study (2006) conducted with a 79.8% White sample including men and women. Similarly, our findings that breakfast was the least consumed meal and dinner was the most consumed meal among Latina women who binge eat was consistent with the meal patterns reported by the predominantly White samples in the Masheb and Grilo (2006) and Harvey et al. (2011) studies. In the same way, the snacking frequencies of these Latinas also followed the research trends, such that evening snack was the most consumed.

Beyond those similarities, this sample of Latina women did not exhibit the same significant eating patterns that the aforementioned predominantly White samples exhibited. For example, eating lunch was associated with a greater likelihood of binge eating among Latinas whereas this correlation was insignificant yet negative among White women such that eating lunch was considered a protective factor against binge eating for them. Similarly, White women who ate three meals daily reported significantly less binges, but Latinas did not share this pattern. In fact, the correlation between combined meal frequency and OBE days ($r = .22, p = .08$) was just the opposite in our sample: it was positive. Although this correlation was not significant at α -level = .05, it was nearing statistical significance, and it is possible that a larger sample size would have

increased the statistical significance. This was the first of several results that demonstrated some key differences between Latinas and White women who binge eat. In the same way, research with White BED samples indicated that combined meal frequency was significantly and negatively correlated with BMI (Masheb & Grilo, 2006), yet this correlation ($r = .12, p = .33$) was reversed among Latinas, albeit nonsignificant, such that greater combined meal frequency was associated with higher BMI. At face value, these unexpected findings contradict the idea that eating three meals daily is considered to protect against binge eating, and consequently higher weight. However, although unexpected, these results regarding Latinas reinforce the need to collect more comprehensive quantitative and qualitative data in order to gain a more complete understanding of the binge eating problem and its variability across ethnic groups. Perhaps, information about which specific meals were more likely to be reported as binges could provide meaningful perspective as to why these Latina women followed some different trends as compared to White women. For example, maybe the frequency of lunch was associated with increased OBE days amongst this sample of Latinas because lunch is the meal that they are most likely to binge during. It is also imperative to explore the nutritional content of the meals and snacks, as there are likely links between food types, caloric values, binges, and BMI. Examining differences in caloric content alone could have a profound impact on understanding the varying nature of the BMI and weight of individuals who binge eat.

While the combined meal frequency did not correlate with BMI or binges in the same direction for Latinas as White women, the combined snack frequency did follow a similar directional trend among both Latinas and Whites. Although not quite significant

at α -level= .05, Latinas who snacked more frequently were more likely to have lower BMI ($r = -.21, p = .092$). However, the frequency of the evening snack alone was significantly and negatively associated with BMI among this Latina sample.

Remembering that BMI was positively and significantly correlated with OBE days in our sample at baseline, future research conducted with larger sample sizes might support the inference that more frequent snacking might also be directly associated with less frequent OBE days and decreased binge eating in general.

Therefore, it is possible that the consumption of regular healthy snacks is even more important than simply consuming regular meals when determining how to reduce both binge eating and BMI. Establishing such a regular pattern of eating is one of the core components for treating binge eating using CBT because it is hypothesized to disrupt the erratic eating patterns that lead to and promote binges. Thus, it may just be that the inclusion of regular snacks is most essential to the maintenance of a regular, binge-free eating pattern. Perhaps, consumption of regular snacks is a means to stave off the between-meal hunger that can promote and lead to binges. Our results from aim 2 further supported this hypothesis.

The Post-hoc ANOVA indicated that participants who increased their mid-afternoon snack frequency were less likely to binge eat. Perhaps, this suggests that dinner is the meal that these women most commonly binged during, and therefore mid-afternoon snacks served as a protective factor against the hunger that may have precipitated an evening binge. After discovering what a strong role increasing mid-afternoon snack frequency played in our sample, we were surprised that we did not notice any significant correlations with mid-afternoon snack frequency in our baseline analyses. Moreover,

even among our CBTgsh sample, the overall mean change of mid-afternoon snack frequency was minimal ($M = -.21$, $SD = 5.84$). Here, this measure of central tendency is quite deceiving and does not clearly represent the wide variability in the change of mid-afternoon snack frequency, which actually ranged from -14 to 15. Further examination of the data revealed that the participants who made sizable increases in their mid-afternoon snack frequency also achieved the largest reductions in OBE days. This helps to explain why mid-afternoon snack frequency was not significant among the baseline measures but that the change in mid-afternoon snack frequency post-treatment was significantly correlated ($r = -.56$, $p = .002$) with the change in OBE days post-treatment. This also explicates why change in mid-afternoon snack frequency significantly predicted change in OBE days.

While change in mid-afternoon snack frequency was the only significant predictor of reduction in binge eating, we can still conclude per the MANOVA results that this CBTgsh treatment yielded meaningful reductions in both OBE days and BMI. This is the first known study to demonstrate significant reductions in BMI as a result of CBT treatment for binge eating. These treatment outcomes provide preliminary evidence for the effectiveness of CBTgsh among Latinas who binge eat. This research represents a critical advancement in the binge eating treatment literature because it supports the utility of CBTgsh as an effective first line of treatment for Latinas who binge eat. This effective yet low-cost, accessible form of treatment could be used to improve the eating patterns of Latinas and other women as well as serve as a platform to promote healthier lifestyles overall.

Despite that our research did not yield any significant results regarding the role of breakfast as a possible protective factor that promotes regular eating and discourages binges, future research should continue to explore this hypothesis in order to determine if breakfast consumption should be an emphasis for binge eating treatment. In this same way, future research should continue to explore the importance of healthy snacks to the maintenance of a binge-free pattern of eating, so that treatment can begin to hone in on these prominent factors influencing binge reduction. Such findings would demonstrate that a participant's adherence to a regular pattern of eating, particularly regular and healthy snacking, will lead to improvements in binge eating, over eating, and BMI.

Several limitations regarding this research should be noted. First, the research relies heavily on self-reported information collected from the EDE. Thus, the accuracy of the data may be compromised due to a lack of objective observations of participants' eating patterns, binge eating, and overeating. Also, the small sample size does not grant convincing statistical power, so it is possible that a larger sample would yield more significant outcomes. Finally, this study did not examine differences in the nutritional content of foods that were consumed during regular eating and binges, which is likely uniquely related to BMI.

While this study provides meaningful implications regarding treatment for binge eating, the literature about binge eating, especially in ethnically diverse populations, is still limited. Although this study yielded some results that matched previous findings, the generalizability of these findings to other populations remains restricted because of the variable findings across research studies. For example, this study demonstrates that some of the eating and binge patterns of Latinas are different than the patterns of White

women, which indicates that culture could have a strong influence on the manifestations of eating disorders. It may also be important to explore the dynamics of binge eating at the family level since eating is often a communal activity and eating patterns and habits are often learned in our home environment. In this way, it could be particularly useful to test and adapt eating disorder prevention and treatment programs for adolescents in order to promote healthy patterns of eating at an earlier age.

Even still, as the problem of obesity continues to escalate in the United States, it remains necessary to focus on treatments that deliver weight-loss results. Thus, in addition to examining the influence of nutritional content and caloric value on the BMI of binge eaters, research should also include physical exercise components in existing treatment programs to test for incremental improvements in BMI and binge reduction. Overall, this thesis represents a notable advancement in the literature for binge eating among Latinas, and the analyses yielded statistically significant results that provide preliminary evidence for the effectiveness of changing meal patterns and CBTgsh on reducing binge eating among Latinas.

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