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Relationship of Fruit, Vegetable, and Fat Consumption to Binge Eating Symptoms in African American and Hispanic or Latina Women

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Abstract

African American (AA) and Hispanic or Latina (HL) women have the highest rates of overweight and obesity of any gender and ethnic groups. Binge eating disorder (BED) is the most common eating disorder in the United States and is linked to overweight and obesity. Traditional treatments for BED may not be appropriate or viable for AA and HL women, because they are less likely than whites to seek treatment for psychological conditions and may have less access to healthcare. Improving dietary habits in those with BED or subthreshold BED may reduce binge eating symptoms. The current study investigated the association of fruit, vegetable, and fat consumption to binge eating symptoms in AA and HL women. AA and HL women in the Health Is Power (HIP) study ($N=283$) reported fruit and vegetable intake, fat intake, and binge eating symptoms. Women were middle aged ($M=45.8$ years, $SD=9.2$) and obese (M BMI=34.5 kg/m², $SD=7.5$). Greater fat consumption was correlated with lower fruit and vegetable consumption ($r_s=-.159$, $p<.01$). Higher BMI ($r_s=.209$, $p<.01$), and greater fat consumption ($r_s=.227$, $p<.05$) were correlated with increased binge eating symptoms. Multiple regression analysis demonstrated that HL women ($\beta=.130$, $p=.024$), higher BMI ($\beta=.148$, $p=.012$), and greater fat consumption ($\beta=.196$, $p=.001$) were associated with increased binge eating symptoms ($R^2=.086$, $F(3,278)=8.715$, $p<.001$). Findings suggest there may be a relationship between fat consumption and binge eating symptoms, warranting further study to determine whether improving dietary habits may serve as a treatment for BED in AA and HL women.

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Statement 2: Contributors

Penny Wilson conceived the research question, led the manuscript writing and conducted the statistical analyses. Daniel P. O'Connor assisted with the data analysis and manuscript writing. Drs. Charles Kaplan and Sharon Bode assisted with manuscript writing. Ms. Scherezade Mama assisted with data collection, project management and manuscript writing and formatting. Rebecca Lee designed the study, led data collection and assisted with manuscript writing. All authors have contributed to and have approved the final manuscript.

Statement 3: Conflicts of interest

All authors declare they have no conflicts of interest.

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Keywords

Binge Eating Disorder; African American; Hispanic; Dietary Habits; Binge Eating

1. Introduction

Binge Eating Disorder (BED) is the most common eating disorder in the United States (Hudson, Hiripi, Pope, & Kessler, 2007), and people with BED and subthreshold BED are usually overweight or obese and seeking treatment for obesity (Guss, Kissileff, Devlin, Zimmerli, & Walsh, 2002; Hudson, et al., 2007; Pike, Dohm, Striegel-Moore, Wilfley, & Fairburn, 2001). BED and subthreshold BED are poorly understood among African American (AA) and Hispanic or Latina (HL) women, who have a higher prevalence of overweight and obesity than any other racial or ethnic group (National Heart Lung and Blood Institute & National Institutes of Health, 2009). The prevalence of BED in AA women seeking treatment for overweight or obesity was reported to be 33.3% (Mazzeo, Saunders, & Mitchell, 2005), while BED in non-treatment seeking, community samples of AA women has been reported to be 1.4% and 4.5% for subthreshold BED (Striegel-Moore et al., 2003; Striegel-Moore et al., 2000; Striegel-Moore, Wilfley, Pike, Dohm, & Fairburn, 2000).

The prevalence of BED and subthreshold BED is less clear among HL women. One study estimated the lifetime prevalence rates of BED in HL women to be 2.3% (Alegria et al., 2007), but given the lack of evidence on BED and subthreshold BED in AA and HL women, it may be more prevalent than previously thought (Sanchez-Johnsen, Dymek, Alverdy, & le Grange, 2003).

Dietary habits may moderate the development of binge eating but have been minimally researched. Most research has focused on food consumption during a binge eating episode rather than on daily dietary habits. One study found participants reporting a reduction in fat consumption reduced the number of binge eating days post-intervention, but the authors did not explore the relationship between calorie or macronutrient changes and binge days (Reeves et al., 2001). The purpose of this study was to determine the relationship of fruit, vegetable and fat consumption to binge eating symptoms in AA and HL women participating in the Health Is Power (HIP) study (NIH 1R01CA109403).

2. Material and Methods

2.1. Participants

AA and HL women were recruited to the HIP study through media, brochures, churches, and internet communication. Four hundred ten women met inclusionary criteria and enrolled in the study (Kueht, McFarlin, & Lee, 2009; Layne, Mama, Banda, & Lee, 2011; Lee & Cubbin, 2009; Lee, Mama, McAlexander, Adamus, & Medina, 2011; Lee, Mama, Medina, Ho, & Adamus, 2011; Lee, Mama, et al., 2011; Lee, Medina, et al., 2011; Lee, O'Connor, et al., 2011; Lee, Wolfe, et al., 2011; Lopez, O'Connor, Ledoux, & Lee, 2011; Mama et al., 2011). The majority (68%) of participants identified as AA. Only participants with complete baseline dietary habits and binge eating data ($N=283$) were included in the current study.

2.2. Procedures

Eligible participants were invited to attend a baseline (T1) health assessment at the University of Houston and completed interviewer-administered questionnaires and a

physical health assessment. Participants were compensated \$20 for completing the assessment.

2.3. Measures

2.3.1. Sociodemographic Information—Items assessing ethnicity, household income, and education were adapted from the *Maternal Infant Health Assessment* (MIHA) survey (California Department of Public Health, 2006), derived from the Center for Disease Control and Prevention's *Pregnancy Risk Assessment Monitoring System* (PRAMS) Questionnaire (Centers for Disease Control and Prevention, 2006). Items have shown good reliability and have been used with samples representing diverse ethnicities (Sarnoff & Hughes, 2005).

2.3.2. Anthropometry—Anthropometric measures of body mass index ($\text{BMI}=\text{kg}/\text{m}^2$) and body fat were collected by trained personnel using established protocols (Kueht, et al., 2009; Layne, et al., 2011; Lee, Mama, Medina, Reese-Smith, et al., 2011; Lee, Medina, et al., 2011; Lee, O'Connor, et al., 2011; Lopez, et al., 2011; Mama, et al., 2011). Individual height was measured using a mobile stadiometer, and body weight and percent body fat were measured using bioelectrical impedance analysis (BIA) using a Tanita TBF-310 body composition analyzer (Tanita, Arlington Heights, Illinois). BMI was calculated using stadiometer heights and BIA body weights. All measures were collected twice, and the average of the two measurements was used for analyses.

2.3.3. 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. The Fruit and Vegetable All-day 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., 2000). This screener has been used widely in both AA and HL adult samples (Ahluwalia et al., 2007; Buller et al., 2008; Greene et al., 2008; Henry, Reimer, Smith, & Reicks, 2006; Resnicow et al., 2004; Resnicow et al., 2000; Thompson, et al., 2000; Thompson, et al., 2002; Woodall et al., 2007). The Fat Screener measures an individual's usual dietary intake of percent calories from fat. The Fat Screener has good validity ($r=0.64$ in men and 0.58 in women) in adults when compared to true intake (Thompson, et al., 2007). The Fat Screener has demonstrated good validity in women (Thompson, et al., 2007; Thompson et al., 2008) and has been used in AA and HL samples (Parker, Coles, Logan, & Davis, 2010; Thompson, et al., 2008).

2.3.4. Binge Eating—The *Binge Eating Scale* (BES) is a self-report questionnaire of 16 items rated on a scale of 0 to 3 (Gormally, Black, Daston, & Rardin, 1982). An overall score is calculated by adding the responses to each question. A higher score indicates greater severity of binge eating symptoms. The BES has demonstrated strong internal consistency in white and AA women (Harrington, Crowther, Henrickson, & Mickelson, 2006; Mitchell & Mazzeo, 2004). Based on the criteria developed by Marcus, Wing, and Hopkins, participants were also categorized into non-binge eaters, moderate binge eaters, and severe binge eaters based on their BES scores (1988). Those with scores below 18 were categorized as non-binge eaters, those with scores between 18 and 26 were categorized as moderate binge eaters, and those with scores above 26 were categorized as severe binge eaters (Marcus, et al., 1988). Both BES scores and categories were used in analyses.

2.4. Statistical Analyses

Sociodemographics, dietary habits and binge eating scores were compared by ethnicity using a Mann-Whitney test to account for skewedness. Non-parametric bivariate analyses for the total sample and by ethnicity were used to determine correlations among

sociodemographic variables, fruit and vegetable consumption, fat consumption, and BES scores and to inform regression models. Two sequential multiple regression models were used to determine the association(s) among variables. Variables were entered in blocks; the first block of both models included intervention group, ethnicity, age, education, income, and BMI. The second block of the first model included the significant variables from the first model and fruit and vegetable consumption, and the second block of the second model included the significant variables from the first block and fat consumption. BES score was the dependent variable in both models.

3. Results

3.1. Participant Characteristics

On average, women were middle-aged ($M=45.8$ years, $SD=9.2$), obese ($M=34.5$ kg/m², $SD=9.2$) and reported annual incomes between \$62,157 and \$82,600; most (92.2%) completed some or graduated from college. AA participants were more educated than HL participants ($U=5953.5$, $p<.001$), had a higher income ($U=6437$, $p=.038$) and consumed more fruit and vegetables ($U=6988$, $p=.007$). Over two thirds (68.9%) of participants were non-binge eaters; 24.7% were moderate binge eaters; 6.4% were severe binge eaters.

3.2. Bivariate Analyses

Correlation coefficients for the total sample are shown in Table 1. Among AA women, fruit and vegetable consumption increased as age ($r_s=.169$, $p<.05$) and income ($r_s=.174$, $p<.05$) increased. BMI also increased as BES scores ($r_s=.250$, $p<.01$) and fat consumption ($r_s=.200$, $p<.01$) increased, and there was a significant negative correlation between BES scores and fruit and vegetable consumption ($r_s=-.219$, $p<.01$). Among HL women, higher education was correlated with decreased fat consumption ($r_s=-.266$, $p<.05$), and fat consumption was significantly positively correlated with BES scores ($r_s=.312$, $p<.01$).

3.3. Multiple Regression Models

Simultaneous multiple regression models indicated HL ethnicity ($\beta=.130$, $p=.024$), higher BMI ($\beta=.148$, $p=.012$), and greater fat consumption ($\beta=.196$, $p=.001$) were associated with increased binge eating symptoms ($R^2=.086$, $F(3,278)=8.715$, $p=.000$). A summary of regression models is shown in Table 2; complete models are available upon request.

4. Discussion

Results suggested a relationship between fat consumption and binge eating symptoms, after adjusting for BMI and ethnicity, but not between fruit and vegetable consumption and binge eating symptoms. As expected, BES scores and BMI were positively correlated, confirming previous findings that binge eating is associated with overweight and obesity (Guss, et al., 2002; Striegel-Moore, Wilfley, et al., 2000; Yanovski & Sebring, 1994). Although increased fruit and vegetable consumption was correlated with decreases in fat consumption and BES scores, this relationship did not hold after adjusting for BMI and ethnicity. Regression models showed that ethnicity, BMI, and fat consumption significantly predicted BES scores and accounted for 8.6% of the total variance in BES scores. Although this is a small amount of the variance, it is not surprising given the multitude of factors that impact binge eating (Stice, 1994; Wardle, Waller, & Rapoport, 2001). The inclusion of ethnicity as a significant predictor confirms bivariate analyses results that the relationship between dietary habits and binge eating symptoms was different for AA and HL women in this sample. This may be due to the differences in education and income seen among AA and HL women, or ethnic or cultural differences.

A surprising finding of this study was the high prevalence (31.1%) of moderate and severe binge eaters—nearly seven times greater than the highest prevalence previously reported for community samples of AA and HL women (Alegria, et al., 2007; Striegel-Moore, et al., 2003; Striegel-Moore, Dohm, et al., 2000; Striegel-Moore, Wilfley, et al., 2000). Although unexpected, the high prevalence may be attributed to the finding during post-study exit interviews that 62% of participants joined the study to lose weight (Lee, O'Connor, et al., 2011), indicating the current study sample may be more closely related to a treatment seeking sample versus a community sample (Jones, 2009). Since not everyone seeks formal treatment to lose weight, community samples described in the literature may not adequately describe the true prevalence of BED or subthreshold BED (Alger-Mayer, Rosati, Polimeni, & Malone, 2009; Ashton, Drerup, Windover, & Heinberg, 2009; Azarbad, Corsica, Hall, & Hood, 2010; Bocchieri-Ricciardi et al., 2006; Niego, Kofman, Weiss, & Geliebter, 2007; Petribu et al., 2006) and may grossly underestimate the prevalence of BED and subthreshold BED among AA and HL women.

This study is one of the first to explore the relationship between dietary habits and binge eating symptoms among ethnic minority women. Binge eating symptoms in minority women are understudied, further contributing to literature in this field. This study included a large sample of mature AA and HL women, and used measured height and weight to compute BMI, more reliable than self-report measures.

This study presents secondary data analyses from a parent study designed to increase physical activity and fruit and vegetable consumption among ethnicity minority women, which may limit generalizability. The sample was mostly well-educated and middle-income, which may limit generalizability to a less educated, lower income population. Self-report measures of fruit and vegetable consumption, fat consumption, and binge eating symptoms are prone to response bias.

5. Conclusions

This study adds to the knowledge of binge eating symptoms and dietary habits in AA and HL women. Increases in fat consumption were associated with increases in BES scores, suggesting reduction in fat consumption in both AA and HL women may lead to reductions in binge eating symptoms and may be an appropriate avenue for treatment of BED in minority women. Additional research is needed to gain a deeper understanding of the relationship between additional specific dietary habits and binge eating symptoms.

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Abbreviations

AA	African American
BED	Binge Eating Disorder

BES	Binge Eating Scale
BMI	Body Mass Index
HIP	Health Is Power
HL	Hispanic or Latina
MIHA	Maternal and Infant Health Assessment
PRAMS	Pregnancy Risk Assessment Monitoring System

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Research Highlights

- Higher fat consumption was associated with lower fruit and vegetable consumption.
- Greater fat consumption was associated with greater binge eating symptoms.
- A relationship exists between dietary habits and binge eating symptoms.

Table 1

Correlations among sociodemographic variables, dietary habits and binge eating

Measure	1	2	3	4	5	6
1. Age						
2. % FPL	.148*					
3. BMI (kg/m ²)	-.036	-.012				
4. Education Level	-.206**	.207**	-.102			
5. Daily servings of fruit and vegetables	.096	.181**	-.042	.087		
6. Daily energy % from fat	.106	.027	.203**	-.187**	-.159**	
7. BES overall score	-.075	-.137*	.209**	-.081	-.149**	.227*

*
 $p < .05$,**
 $p < .01$

Table 2

Summary of regression analyses predicting BES

Variable	B	SEB	β	t	p	R ²
Block 1, All Models						
Constant	6.422	2.239		2.869	.004	
Ethnicity	2.267	1.006	.132	2.254	.025	
BMI	.194	.062	.182	3.113	.002	.049
Block 2, Model 1						
Constant	5.328	2.757		1.933	.054	
Ethnicity	2.062	1.017	.120	2.028	.044	
BMI	.187	.063	.176	2.998	.003	
Daily servings of fruit and vegetables	-.223	.168	-.078	-1.324	.187	.055
Block 2, Model 2						
Constant	-5.226	4.096		-1.276	.203	
Ethnicity	2.235	.988	.130	2.262	.024	
BMI	.158	.062	.148	2.532	.012	
Daily energy % from fat	.407	.121	.196	3.370	.001	.086