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Eating behaviors among low-income obese adults in the United States: does health care provider's advice carry any weight

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Abstract

The U.S. Preventive Task Force recommends that all patients be screened for obesity and given appropriate weight loss advice, if needed, as nutrition counseling by primary care physicians is a key objective for Healthy People 2020. This study assesses the association between health care provider's (HCP) advice to lose weight and eating behaviors among obese individuals. Data were collected using a household survey of adults in five New Jersey cities in 2009–10. Analyses presented are limited to 548 obese participants. Negative-binomial regression analysis determined the association of participants' eating behaviors and HCP's advice to lose weight, after adjusting for the participant's attempt to lose weight and demographic variables. Despite being obese, only 48% of the participants received weight loss advice from their HCP while 68% stated they were attempting to lose weight. HCP's advice to lose weight was associated with increased salad and fruit consumption ($p=0.03$ and $p=0.01$). Attempting to lose weight, after adjusting for HCP's advice, was positively associated with a higher consumption of fruit ($p=0.004$), vegetables ($p=0.01$), and with eating fruits and vegetables as snacks ($p<0.001$). Attempting to lose weight was negatively associated with consumption of sweet snacks ($p=0.03$), sugar sweetened beverages ($p=0.002$) and fast food ($p=0.04$). There were no significant interactions between HCP's advice and attempts to lose weight. Obese adult's attempt to lose weight, and not HCP's advice to lose weight, is a predictor for healthy eating behaviors. Interventions in medical practices should train HCPs on effective strategies for motivating obese patients to adopt healthier lifestyles.

Keywords

Weight loss; Health Care Provider advice; Nutrition counseling; Obesity management; Primary care

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Introduction

The high rate of obesity among adults is a public health concern; more than one-third of adults in the United States are obese, 6.4% have extreme obesity (Ogden et al., 2014) and the rate of obesity has increased 134% since 1980 (LeBlanc et al., 2011). Obesity raises the risk for heart disease, diabetes, cancer and stroke (Health, 1998). It is estimated that 20% of medical care costs in the United States are spent on obesity-related diseases, at \$209.7 billion annually (Cawley and Meyerhoefer, 2012). Healthy lifestyle choices, such as being physically active and eating nutrient-dense foods, can help prevent chronic disease (Chiuve et al., 2012; Lee et al., 2012). In order to prevent the development of chronic disease, effective strategies are needed to help obese individuals adopt healthy eating habits.

Nutrition and weight loss counseling are key strategies to improve the health of obese individuals. Eighty two percent of U.S. adults have seen a health care provider (HCP)¹ within the past year (Blackwell et al., 2012) and nutrition counseling by primary care physicians is a key objective for Healthy People 2020 (U.S. Department of Health and Human Services). The U.S. Preventive Task Force recommends that all patients are screened for obesity and are given appropriate weight loss advice, if needed. Advice may include healthy eating for weight loss, physical activity and behavioral management techniques (LeBlanc et al., 2011).

Unfortunately, many HCPs do not provide weight loss or nutrition counseling for overweight and obese individuals. Rates for weight-related counseling by HCPs range from 25% (Bleich et al., 2011) to 67% among obese populations (Pool et al., 2014). Many barriers exist for weight loss and nutrition counseling by HCPs, including lack of time, inadequate reimbursement and lack of knowledge both on nutrition and effective counseling techniques (Kolasa and Rickett, 2010; Wynn et al., 2010). The U.S. National Heart, Lung and Blood Institute released evidence-based guidelines for the treatment of overweight and obese patients, but HCPs are not adequately using these recommendations (Antognoli et al., 2014; US National Heart, 2000). Weight loss advice varies by practice, individual HCP and by patient demographics, leaving most obese patients receiving no or inadequate weight loss advice (Anis et al., 2004; Bleich et al., 2011; Ko et al., 2008; Shiffman et al., 2009). The low prevalence of weight loss related advice by HCPs and the lack of adherence to national guidelines are two potential barriers to effectively helping obese individuals adopt healthier lifestyles.

Previous studies have explored the relationship between HCP's advice to lose weight with patient attempts to lose weight and with self-reported weight loss strategies of eating less fat and calories, but no studies published to date have looked at the consumption of specific foods or food groups (Bish et al., 2005; Jackson et al., 2013; Kabeer et al., 2001; Loureiro and Nayga Jr, 2006; Rose et al., 2013; Sciamanna et al., 2000). This distinction is important because most individuals are not able to accurately estimate fat or calorie content of commonly consumed foods (Lichtman et al., 1992). Nutrient recommendations are often created for health professionals and are then translated in terms of food groups for the public

¹HCP=Health Care Provider

to follow. Using data from a low-income, high minority obese sample, this study explores the relationship between HCP's advice to lose weight and consumption of key energy and nutrient-dense foods. We also examine how obese individuals' own efforts to lose weight are associated with eating behaviors. We hypothesize that HCP's advice to lose weight and individual's attempts to lose weight will be independently and positively associated with healthier eating behaviors while being negatively associated with negative eating behaviors.

Methods

Data Source

The data used in this study were collected using a random-digit-dial household phone survey between 2009 and 2010. Interviews were conducted with 1,708 adults in five cities in New Jersey: Camden, Newark, New Brunswick, Trenton and Vineland. Eligible households had at least one child aged three to 18 years. The respondent of the survey was the adult who made most of the food purchasing decisions for the household. Interviews were conducted in both English and Spanish and participants were given an incentive of \$10 for their participation. Each interview took on average 36 minutes to complete. The survey instruments were field tested and the interviewers were trained to ensure high quality of data collected.

The survey was divided into 10 sections: introduction/household inventory, health status, height/weight, food environment, physical environment for activity, child behavior, adult behavior, health care coverage, employment and earnings, and demographics. This study used self-report answers from respondents of their demographics, health behaviors, and eating habits.

Study Sample

The analysis presented here are limited to 548 obese adults with complete data on all variables used in the analysis. Obesity was categorized as a Body Mass Index (BMI) greater than or equal to 30. Obesity was then broken into two categories, following the National Heart, Lung, and Blood Institute guidelines: obesity, BMI 30–39, and extreme obesity, BMI 40 and greater (US National Heart, 2000). Participant BMI was calculated from self-reported height and weight. BMI based on self-reported data is highly correlated with professionally measured BMI (McAdams et al., 2007).

Outcome Variables

A total of 12 eating behaviors were chosen as outcomes based on energy and nutrient density, as well as their association with obesity (Khan et al., 2009; Sanchez et al., 2009). Frequency-based questions used to determine eating behaviors were adapted from previously validated items and have been shown to have significant correlations with 24-hour recalls (Murphy et al, 2001; Nelson and Lytle, 2009) as well as have high test-retest reliability (Nelson and Lytle, 2009). Questions were also adapted from the Behavior Risk Factor Surveillance Survey and 2009–10 National Health and Nutrition Examination Survey (Centers for Disease Control and Prevention; Centers for Disease Control and Prevention). For each type of food or beverage included, participants were asked, "How often do you eat/drink (food/beverage item)." Response options included times per day, per week or per

month. Daily consumption frequency was calculated for ten eating behaviors (fruit, vegetables, soda, sweet snacks, salty snacks, salad, eating fruits and vegetables as snack (FV snacks), fruit drinks, fruit juice, and total sugar sweetened beverages) and weekly consumption frequency for fast food and breakfast.

Explanatory Variables

Information on age, gender, race/ethnicity, education, income, height and weight were collected from each respondent. The respondent's attempt to lose weight was determined by the question, "Are you doing anything to lose weight?" with possible responses of "yes", "no", "don't know" or refusal to answer. Health care provider's advice to lose weight was determined by the question, "In the past 12 months, has a doctor, nurse, or other health professional given you advice about your weight?" Responses categories included "yes, lose weight", "yes, gain weight", "yes, maintain weight", "no advice given about weight", "don't know/not sure" or refusal to answer. Those responding "yes, lose weight" were coded as 1 for HCP's advice to lose weight while those who received no advice were coded as 0. Due to potential conflicting information in this obese sample, those who responded with "yes, gain weight" or "yes, maintain weight" were dropped from the sample (n=13). Income was categorized by a ratio of Federal Poverty Level to account for differences in income based on household size.

Analysis

Descriptive analyses were run on all variables. Bivariate analyses were run using chi-square test for categorical variables and t-tests were used for continuous variables. The outcome variables' distributions were skewed and had a large spread with excess zeroes; thus, negative binomial regression was considered appropriate for multivariable analysis. A significant correlation was expected between HCP's advice to lose weight and participant's attempts to lose weight, raising the concern for multicollinearity, but investigations revealed a spearman's rho of 0.17. The models were first run with either HCP's advice to lose weight or attempting to lose weight in the model, and then with both these variable included in each regression model at the same time to determine independent effects. An interaction term (attempting to lose weight * HCP's advice to lose weight) was calculated and added to the model to test for moderation. All models adjusted for covariates, including age, gender, race, BMI, poverty status, education, and city of residence. Age, BMI and poverty status were included as categorical variables, as presented in Table 1. All analyses were conducted in Stata (version 13.1) and were considered significant at p 0.05.

Results

A total of 548 obese adults with children in their household were included in these analyses (Table 1). The sample was largely female at 83%. Fifty three percent of the sample was non-Hispanic black and 33% were Hispanic. Eighty six percent of the sample did not graduate college, and 64% were below 200% of the Federal Poverty Level. Of all 548 obese respondents, only 264 (48%) received advice to lose weight from their HCP in the last 12 months. Among those who were extremely obese, 64% received advice to lose weight. Sixty eight percent of all respondents stated that they were attempting to lose weight. A higher

prevalence (72%) of those who were extremely obese (BMI 40) reported attempting to lose weight, compared with 67% of obese (BMI 30–39) individuals. Seventy six percent of those who received HCP's advice to lose weight were attempting to lose weight compared to only 60% of those who did not receive advice.

In unadjusted analyses, HCP's advice to lose weight did not vary by gender, ethnicity, or poverty status; however, significant differences were observed by age, BMI category, education and individual's efforts to lose weight.

Consumption of healthy, nutrient-dense foods in this sample were consumed infrequently and energy-dense snack foods were eaten frequently (Table 2). The average mean frequency of fruit consumption was only once per day and vegetables was 2.2 times per day while fast food was eaten weekly. Those who received HCP's advice to lose weight and those who reported attempting to lose weight had a higher frequency of fruit consumption ($p=0.03$ and $p=0.003$, respectively). The mean consumption of sugar sweetened beverages was more than once per day. However, those who reported attempting to lose weight drank slightly less than once per day and the difference among those trying to lose weight and those not trying to lose weight was statistically significant ($p<0.001$).

Results from multivariable negative binomial regression examining the association between HCP's advice to lose weight and dietary behaviors, adjusting for BMI category, gender, race/ethnicity, education, poverty status, age, and city of residence are presented in Table 3. Model 2 adjusted for these variables, as well as the respondent's attempt to lose weight. Higher fruit and salad consumption were associated with HCP's advice to lose weight ($p=0.03$ and $p=0.01$, respectively). However, only salad consumption remained significant after adjusting for attempting to lose weight ($p=0.03$). None of the other eating behaviors reached statistical significance.

Table 4 presents the analysis examining the association between individual's reports of attempting to lose weight and dietary behaviors adjusting for the same set of covariates as in Table 3. There were many significant associations in the multivariable regression models between obese individual's reported attempt to lose weight and positive eating behaviors, which all remained significant after adjusting for HCP's advice to lose weight. Attempting to lose weight was positively associated with a higher consumption of fruit ($p=0.004$), vegetables ($p=0.01$), and with eating fruit and vegetables as snacks ($p<0.001$). Attempting to lose weight was negatively associated with consumption of sweet snacks ($p=0.03$), soda ($p<0.001$), all sugar sweetened beverages ($p=0.002$) and fast food ($p=0.04$). A separate model that included an interaction term between HCP's advice to lose weight and individual's reported attempt at losing weight was also run. None of the interaction terms were significant.

Discussion

This study examined independent associations between HCP's advice to lose weight and obese individual's attempts to lose weight across twelve eating behaviors. Overall results show few associations between HCP's advice and dietary behaviors. HCP's advice was

positively related to increased frequency of fruit and salad consumption. Several significant relationships were observed between individual's attempts at losing weight and positive dietary behaviors, including a higher consumption of fruit, vegetables, and with eating fruit and vegetables as snacks. Attempting to lose weight was negatively associated with consumption of sweet snacks, soda, all sugar sweetened beverages and fast food. No interactions between HCP's advice to lose weight and attempting to lose weight were observed for any eating behaviors.

Given that the sample used in this study were all obese, the fact that only 48% received HCP's advice to lose weight is discouraging. A recent study found that 67% of its obese participants were advised by their HCP of their weight (Pool et al., 2014). However, this study's sample was taken from NHANES population which was a mostly white, higher-income population which differs from the respondents in the current study. Other studies have reported a range of 40–65% of their sample receiving weight loss advice (Abid et al., 2005; Jackson et al., 2013; Loureiro and Nayga Jr, 2006; Rodondi et al., 2006).

The low rate of receiving advice to lose weight by a HCP may be due to a number of reasons. A survey of primary care providers found that many believed there was a lack of time to discuss weight loss techniques and many insurance companies do not reimburse physicians for time to provide weight loss (Kolasa and Rickett, 2010). Some providers feel they lack the knowledge and resources to provide nutrition or weight loss advice (Kolasa and Rickett, 2010; Puhl and Heuer, 2009). Physician and patient characteristics may also play a role in who received weight loss advice; Dutton et al. found that female physicians were more likely to provide weight loss advice (Dutton et al., 2014). Unfortunately, even health professionals have been found to carry implicit biases and negative attitudes regarding those who are obese, which may prevent them from initiating weight loss advice (Puhl and Heuer, 2009; Schwartz et al., 2003; Teachman and Brownell, 2001). Obese patients have stated they have been treated disrespectfully, criticized, or scared into losing weight by their physician (Anderson and Wadden, 2004; Mold and Forbes, 2013). These feelings may lead to obese patients avoiding care (Mold and Forbes, 2013). Clearly, training is needed for physicians so they feel prepared and knowledgeable in providing weight loss advice as well as providing sensitive care to obese patients.

To our knowledge, this is the first study to examine the relationship between HCP's advice to lose weight and specific food behaviors, both healthy and unhealthy, and we found an independent positive association with only one of the twelve eating behaviors (salad consumption). Previous studies that examined the association between weight loss advice and eating behaviors found mostly positive results but defined eating behaviors as “reduced the amount of fat or calories” (Dorsey and Songer, 2011), “attempted to lose weight by changing their diet” (Pollak et al., 2007), “modified diet to lose weight” (Rodondi et al., 2006) or “eating fewer calories and less fat to lose weight” (Loureiro and Nayga Jr, 2006). In order for an individual to successfully adopt healthy behaviors to lose weight, weight loss advice should include specific eating behaviors for weight loss rather than theoretical constructs/classes like eating fewer calories or less fat.

The results from the current study found that a significantly higher fraction of obese adults reported attempting to lose weight if they received HCP's advice to lose weight (54% vs 46%). This aligns with a recent meta-analysis in which all but one of 22 studies found a positive association between receiving HCP's advice to lose weight and an individual's weight loss efforts (Rose et al., 2013). Previous studies have found that those who received advice to lose weight were 2.79–4.6 times more likely to be attempting to lose weight than those who did not (Abid et al., 2005; Galuska et al., 1999; Jackson et al., 2013; Kabeer et al., 2001).

Individuals who reported attempting to lose weight practiced several healthy behaviors, both in terms of consuming healthier, nutrient-dense foods more often (fruit, vegetables, and eating fruit and vegetables as snacks) and consuming energy-dense foods less often (sweet snacks, soda, total sugar sweetened beverages, fast food). These results align with previous research that when individuals are consciously attempting to lose weight, they focus on decreasing calories and fat and increasing fruit and vegetable intake (Andreyeva et al., 2010; Norman et al., 2013).

One would expect a synergistic effect of HCP's advice to lose weight and attempting to lose weight, but the lack of significant interactions in this study suggests that among those who are attempting to lose weight, receiving HCP's advice to lose weight is not associated with a greater increase in positive eating behaviors. While receiving HCP's advice is associated with being more likely to attempt to lose weight, those who are already motivated to change their behavior (and thus attempting to lose weight) did not get additional benefits from receiving HCP's advice.

The quality of weight loss advice has been shown to affect behavior and motivation. The 5A's counseling framework is used to assess the quality of obesity counseling. In the 5A's framework, HCPs are told to: Assess behavior, Advise change, Agree on goals, Assist in barriers and Arrange for follow-up (Glasgow et al., 2006; Jay et al., 2010). Previous studies have found that the more 5A techniques were used in office visits, the more motivated patients were to lose weight and eat better (Alexander et al., 2011; Jay et al., 2010). Two other effective methods for weight loss advice include using motivational interviewing techniques and empathizing with patients. Cox et al. found that patients had improved eating behaviors and higher confidence in their ability to lose weight when their physician utilized motivational interviewing methods and empathy (Cox et al., 2011). Another study found that the use of motivational interviewing and empathy increased the likelihood that patients would attempt to lose weight and change their exercise routine (Pollak et al., 2007).

One limitation of the present study is that it is not known what type and at what frequency any advice was given to each respondent by their HCP. It is possible some HCPs provided higher quality weight counseling using effective strategies such as the 5A's approach, while others briefly mentioned losing weight with no specific weight loss advice given. It is also possible that participants may have received advice to lose weight by exercising more or by other means, rather than changing eating behavior.

Another limitation of this study is the cross-sectional design. It is unknown if people who are attempting to lose weight proactively talk with their HCP about their weight and health, or if it is the HCP's advice which causes weight loss efforts. To examine the independent effect of these two variables, we included both HCP's advice and attempting to lose weight in the same multivariable model. The survey question to capture receiving HCP weight loss advice was stated within the past 12 months, and it is possible that some participants may have received weight loss advice beyond a one year time period. There are also many factors associated with weight loss behaviors, such as self-efficacy, coping strategies, social support and psychological health (Elfhag and Rössner, 2005), which were not captured in this study. Another limitation is the use of self-reported data. Data on advice to lose weight is subject to the respondent's memory. Also, underreporting of unhealthy eating behaviors is common among obese subjects (Goris et al., 2000). There is a potential for same source bias since both the outcome variables and predictor variables were derived from the participant's self-report. Lastly, eating behaviors were determined by frequency, not quantity. It is possible that someone may eat large serving sizes few times per day, or eat small servings several times per day.

There are several strengths to this study. The inclusion of a comprehensive set of diet related behaviors in the survey allowed for examining the associations for both nutrient-dense and energy-dense-nutrient-poor foods. The study sample included low-income adults from ethnic and racial minorities – groups that carry a higher burden of obesity.

Further work is needed to examine the long term effect of HCPs advice and individual's attempt to lose weight on dietary behaviors and weight outcomes. Future studies should objectively measure the quantity and quality of weight loss advice, physician and patient characteristics, eating habits and weight loss behavior over time.

Conclusion

This study highlights that HCP's advice to lose weight is associated with a limited number of specific dietary behaviors among obese individuals, but an individual's own attempts to lose weight is associated with a variety of healthier behaviors. However, a greater percentage of individuals who receive HCP's advice are likely to report attempting to lose weight. Training HCPs to provide culturally appropriate advice based on national guidelines using evidence-based approaches, such as the 5A's, can play a critical role in encouraging obese individuals to adopt healthier eating behaviors conducive to losing weight.

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Highlights

- Doctor’s advice vs attempts to lose weight and eating behaviors among obese
- Doctor’s advice to lose weight associated with very few healthy behaviors
- Attempting to lose weight positively associated with several healthy behaviors
- Attempting to lose weight negatively associated with eating calorie dense foods

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Table 1

Demographic characteristics and weight loss efforts for all obese respondents and by whether they received advice to lose weight from a health care provider. Data collected from five New Jersey cities in 2009–10.

	All Respondents (n=548) n(%)	No HCP's Advice (n=284) n(%)	HCP's Advice (n=264) n(%)	P-value for difference
<i>Demographics</i>				
Age				<0.001
18–34	153(27.9%)	95(62.1%)	58(37.9%)	
35–54	328(59.9%)	159(48.5%)	169(51.5%)	
55+	67(12.2%)	30(44.8%)	37(55.2%)	
Gender				0.52
Male	93(17%)	51(54.8%)	42(45.2%)	
Female	455(83%)	233(51.2%)	222(48.8%)	
Race/ethnicity				0.12
Non-Hispanic white	68(12.4%)	41(60.3%)	27(39.7%)	
Non-Hispanic black	292(53.3%)	144(49.3%)	148(50.7%)	
Hispanic	181(33%)	93(51.4%)	88(48.6%)	
BMI category				<0.001
30–39 (obese)	450(82.1%)	249(55.3%)	201(44.7%)	
40+ (extreme obesity)	98(17.9%)	35(35.7%)	63(64.3%)	
Education				0.04
Less than high school	82(15%)	47(57.3%)	35(42.7%)	
High school or equivalent	218(39.8%)	111(50.9%)	107(49.1%)	
Some college	169(30.8%)	76(45%)	93(55%)	
College Graduate	79(14.4%)	50(63.3%)	29(36.7%)	
Poverty status				0.32
100% poverty level	177(32.3%)	100(56.5%)	77(43.5%)	
100–199% poverty level	171(31.2%)	82(48%)	89(52%)	
200–399% poverty level	133(24.3%)	71(53.4%)	62(46.6%)	
400% poverty level	67(12.2%)	31(46.3%)	36(53.7%)	
<i>Weight Loss Behavior</i>				
Attempting to lose weight				<0.001
No	176(32.1%)	113(64.2%)	63(35.8%)	
Yes	372(67.9%)	171(46%)	201(54%)	

Note: Chi-squared analysis used to determine p-value of difference among groups.

Mean frequency of consumption of key food and beverage items for all obese respondents, those who received HCP's advice to lose weight, and those who were attempting to lose weight.^a Data collected from five New Jersey cities in 2009–10.

Table 2

Food and beverage items ^b	Entire Sample (n =548) Mean Frequency of Consumption (SD)	HCP's Advice to Lose Weight		P-value	Attempting to Lose Weight		P-value
		Mean Frequency of consumption (SD)	No		Yes	Mean Frequency of Consumption (SD)	
Fruit-all (daily)	0.99(1.16)	0.89(1.01)	1.1(1.30)	0.03	0.78(1.03)	1.09(1.21)	0.003
FV snacks (daily)	0.75(0.95)	0.74(0.88)	0.76(1.02)	0.74	0.54(0.79)	0.85(1.00)	<0.001
Fruit Juice (daily)	0.91(1.33)	0.84(1.18)	0.99(1.46)	0.17	0.87(1.35)	0.93(1.32)	0.62
Vegetables -all (daily)	2.20(1.60)	2.10(1.38)	2.3(1.80)	0.13	1.94(1.53)	2.32(1.62)	0.01
Salad (daily)	0.75(1.00)	0.64(0.66)	0.86(1.26)	0.01	0.66(1.08)	0.79(0.96)	0.16
Breakfast (weekly)	4.75(2.61)	4.76(2.63)	4.73(2.60)	0.88	4.41(2.76)	4.91(2.53)	0.04
Sweet snacks (daily)	0.30(0.59)	0.31(0.58)	0.28(0.59)	0.59	0.37(0.51)	0.26(0.62)	0.05
Salty snacks (daily)	0.20(0.36)	0.21(0.35)	0.18(0.37)	0.32	0.25(0.43)	0.18(0.32)	0.03
Soda (daily)	0.49(1.09)	0.52(1.02)	0.46(1.16)	0.55	0.81(1.48)	0.34(0.81)	<0.001
Fruit Drinks (daily)	0.61(1.01)	0.63(0.90)	0.58(1.12)	0.57	0.57(0.88)	0.62(1.07)	0.53
Sugar Sweetened Beverages -all (daily)	1.10(1.53)	1.15(1.39)	1.04(1.68)	0.42	1.38(1.73)	0.96(1.42)	0.003
Fast food (weekly)	0.99(1.80)	1.12(2.22)	0.85(1.17)	0.07	1.09(1.76)	0.94(1.82)	0.36

^aSignificance reported for differences between those who received HCP's advice or not and between those who were attempting to lose weight or not.

^bAll frequencies are per day or per week, as noted
Note: T-test analysis used to determine differences in the means.

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Table 3

Adjusted prevalence ratios for frequency of consumption of selected food and beverage items for obese individuals who received HCP's advice to lose weight. Data collected from five New Jersey cities in 2009–10.

Food and beverage items ^c	Model 1 ^a		Model 2 ^b	
	PR	CI	PR	CI
Fruit-all	1.23	1.02, 1.48	1.17	0.97, 1.42
FV Snacks	1.03	0.84, 1.27	0.96	0.78, 1.18
Fruit Juice	1.22	0.98, 1.5	1.21	0.97, 1.5
Vegetables - all	1.10	0.97, 1.24	1.07	0.95, 1.2
Salad	1.30	1.06, 1.61	1.28	1.03, 1.58
Breakfast (weekly)	0.97	0.87, 1.07	0.95	0.86, 1.06
Sweet Snacks	0.89	0.64, 1.24	0.95	0.68, 1.33
Salty Snacks	0.87	0.58, 1.29	0.91	0.61, 1.35
Soda	0.91	0.67, 1.24	1.05	0.77, 1.43
Fruit Drinks	0.93	0.73, 1.2	0.92	0.71, 1.18
Sugar Sweetened Beverages - all	0.91	0.74, 1.12	0.96	0.78, 1.18
Fast Food (weekly)	0.82	0.66, 1.02	0.84	0.68, 1.05

^aModel 1: adjusted for BMI, gender, race, education level, poverty level, age, city of residence

^bModel 2: in addition to all variables in model 1, model two also adjusted for whether the respondent was attempting to lose weight.

^cAll frequencies are per day, except when indicated as weekly frequencies of consumption.

Table 4

Adjusted prevalence ratios for frequency of consumption of selected food and beverage items for obese individuals who report attempting to lose weight. Data collected from five New Jersey cities in 2009–10.

	Model 1 ^g		Model 2 ^h	
	PR	CI	PR	CI
Fruit-all	1.39	1.13, 1.72	1.36	1.1, 1.67
FV Snacks	1.62	1.28, 2.05	1.63	1.29, 2.07
Fruit Juice	1.09	0.87, 1.37	1.06	0.84, 1.33
Vegetables - all	1.22	1.07, 1.39	1.21	1.06, 1.38
Salad	1.21	0.97, 1.52	1.17	0.93, 1.47
Breakfast (weekly)	1.09	0.98, 1.21	1.10	0.98, 1.23
Sweet Snacks	0.68	0.49, 0.94	0.68	0.49, 0.95
Salty Snacks	0.69	0.46, 1.02	0.70	0.47, 1.04
Soda	0.43	0.32, 0.58	0.43	0.32, 0.58
Fruit Drinks	1.11	0.85, 1.45	1.13	0.86, 1.48
Sugar Sweetened Beverages - all	0.71	0.58, 0.87	0.71	0.58, 0.88
Fast Food (weekly)	0.77	0.62, 0.97	0.79	0.63, 0.99

^gModel 1: adjusted for BMI, gender, race, education level, poverty level, age, city of residence

^hModel 2: in addition to all variables in model 1, model two also adjusted for whether the respondent received HCP's advice to lose weight.