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Reported Food Choices in Older Women in Relation to BMI and Depressive Symptoms

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Abstract

This paper examines the relationships among reports of depressive symptoms, BMI and frequency of consumption of 30 foods in 4,655 middle-aged women. Food was grouped into three categories: high-calorie sweet, high-calorie nonsweet, and low calorie. Controlling for total energy intake, BMI and depressive symptoms were both inversely associated with a higher frequency of consumption of low-calorie foods. BMI was positively associated with consumption of high-calorie nonsweet foods and negatively related to consumption of high-calorie sweet foods. Depressive symptoms were positively associated with sweet foods consumption and negatively associated with nonsweet foods consumption. These findings suggest that the positive association between BMI and depression in women may be mediated by sweets consumption. This is consistent with the hypothesis that eating sweet foods reduces negative affect.

Keywords

Depression; food; choice; obesity

Introduction

An increasing body of literature shows that obesity/body weight and depression are positively related. Community surveys have found associations between obesity and depressive symptoms (Johnston et al, 2004), diagnosis of depressive disorder (Carpenter et al, 2000; Onyike et al, 2003), history of depression (Carpenter et al, 2000), and measures of psychological distress (Heo et al, 2005). The association seems to be stronger in women than in men (Stunkard et al, 2003; Faith et al, 2002; Carpenter et al, 2000; Onyike et al, 2003). Longitudinal studies have suggested a bidirectional association, such that depression predicts later development of obesity, and obesity predicts later development of depression (Dong et al, 2004; Roberts et al, 2002).

Little data are available that identify behavioral or biological variables linking obesity and depression. Body weight is associated with reported consumption of foods with high energy density and is negatively associated with reported consumption of foods with low energy density (French et al, 1994). Elevated body weight is also associated with higher reports of depressive symptoms and other negative mood states (Hasler et al, 2004; Roberts et al, 2002; Palinkas et al, 1996; Istvan, 1992). Both animal and human studies have suggested that stress and depression are associated with cravings for sweets (Robbins et al, 1980 and Willner et al, 1998) and that chronic sweet consumption may reduce stress-induced release of cortisol (Anderson et al, 1987). Patients with seasonal affective disorder show a preference for sugar-rich foods in winter months (Kräuchi et al, 1999).

The present study reports analyses conducted on data from a large epidemiologic study examining the relationship between obesity and clinical depression in women (Simon et al, 2008). Its purpose was to explore the potential relationships among food consumption, depressive symptoms and body weight in these women. Frequency of consumption of 30 specific foods or groups of foods was examined in relation to body mass index (BMI) and depressive symptoms. Foods were grouped into three categories: high-calorie sweet, high-calorie nonsweet, and low calorie; the categories were selected with evidence from previous research (Dubé et al, 2005)

Based on prior research, it was anticipated that consumption of foods of high and low energy density would be positively and inversely related to BMI, respectively. It was also predicted that depressive symptoms would be associated with a higher consumption of sweet foods.

Methods

Data presented in the paper were from a telephone survey of 4,655 women between the ages of 40 and 65 enrolled in the Group Health Cooperative, a group model prepaid health plan serving approximately 500,000 members in Washington and northern Idaho (for survey methods see Simon et al, 2008). Prospective respondents were identified from a registry of women who had previously completed a survey about breast cancer risk. The survey response rate was 61.5%.

Measures

Height and weight were obtained by self-report on the telephone survey. BMI was computed ($\text{weight (kg)} \div \text{height (m}^2\text{)}$).

Demographic information used in the report includes age (in years), ethnicity (Hispanic, American Indian or Alaskan Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White), and education level (eight response categories ranging from less than 8 years to postgraduate degree).

Depressive symptoms were assessed using the 9-item Patient Health Questionnaire (PHQ) (Spitzer, 1999). This measure is a self-report version of the questions used in clinical interviews to define depression using DSM-IV criteria, American Psychiatric Association (2000). Evaluation studies have shown excellent agreement between diagnoses of clinical depression using the PHQ and a clinician-administered structured interview in samples of general medical outpatients and medical inpatients; the measure demonstrated sensitivity of .73 and specificity of .95 in a sample of 585 primary care patients (Spitzer, 1999; Diez-Quevedo, 2001; Kroenke, 2001). It has also been shown to be valid for use in a representative community sample (Martin, 2006). The form of the questionnaire is to ask the extent to which individuals experience each of the nine core symptoms of depression. Response options are on a 4-point scale from "None of the time" to "Nearly all the time." For the purposes of this report, depressive symptoms were

defined as the sum of responses on the PHQ across all nine items. A score of 10 or more on this scale represents a moderate level of depressive symptoms, 20 or more severe depression. (Kroenke et al, 2001).

Diet

The dietary assessment measure used in the current study was a 39-item food frequency questionnaire; 30 of the items were derived from a 60-item Food Frequency Questionnaire (FFQ) developed for the National Cancer Institute by Block in 1986 (Block, 1986). The 30 items were those that correlated most highly with estimated energy intake in prior studies using this instrument. The remaining 9 foods in the FFQ were added at the request of one of the study investigators and are not considered in the present analysis. For each food or group of foods listed, participants were asked how often they ate it during the last six months and their typical serving size in relation to a reference medium portion. Frequencies were converted to units of times per day weighted by typical portion size (0.5 for small, 1.0 for medium, 1.5 for large, and 2.0 for extra large).

Food items were grouped for the present analysis into three groups: high-calorie sweet (cake, chocolate, cornbread, sweetened soda, and sweetened fruit drinks); high-calorie nonsweet (french fries, potato salad, spaghetti, buttered bread, chips, mayonnaise, hamburger, steak, beef stew, fried chicken, fried fish, pork, eggs, margarine, lunch meat, bacon, butter, cheese, and whole milk); and low-calorie (orange juice, green salad, roast chicken, baked fish, low-fat milk, and cold cereal). Frequency of consumption of each food group was calculated by summing across food items.

Analysis

Analysis of the relationship between food choices, BMI, and depressive symptoms was done in two steps. First, the bivariate relationships between depressive symptoms, BMI and the frequency of consumption of foods in one of these groups were assessed using linear regression analysis with total-calorie intake included as a covariate. The second step examined the results of multivariate regression models predicting frequency of consumption of each food group using BMI, depressive symptoms, and total caloric intake as predictors. Analyses were done using linear regression models in SAS, version 8.2.

Results

Demographic descriptors and means for each of the variables used in the present analysis are shown in Table 1. The population of women was 52 years of age on average, about 25% reported having a college degree, most described themselves as white and their average BMI was 33.4 kg/m². The mean level of depressive symptoms was comparable to what would be expected in a population sample. The unit of consumption of specific foods is times per day.

Table 2 presents the results of the bivariate and multivariate analyses. For all analyses, estimated total energy intake, which was derived from the 30-item FFQ, was included as a covariate. In bivariate analyses, lower intake of low-calorie food was associated with both higher BMI and more depressive symptoms. Greater intake of high-calorie sweet foods was associated positively with depressive symptoms but not BMI. Greater intake of high-calorie foods was positively associated with BMI, but not depressive symptoms. Including both BMI and depressive symptoms in the analyses sharpened the foods choice differences related to BMI and depressive symptoms. With both terms in the model, both BMI and depression were independently associated with low consumption of low-calorie foods. Depressive symptoms were associated positively with consumption of high-calorie sweet foods and negatively with

consumption of high-calorie, nonsweet foods. BMI was associated positively with consumption of high-calorie, nonsweet foods, but negatively with high-calorie, sweet foods.

Discussion

This study examined the extent to which the positive association between BMI and depressive symptoms is related to specific food choices. The principal finding was that BMI and depressive symptoms appear to be associated with different food preferences, sweet foods in the case of depressive symptoms and nonsweet in the case of BMI. The effect sizes observed were small, which is not surprising given the lack of precision in food frequency measures. Nevertheless, they provide further evidence of a preference for high-calorie sweets among those with depressive mood. They are also consistent with recent findings from Dubé, et al. that people experiencing negative affect prior to consumption of comfort food are more likely to choose sweets than nonsweets or low-calorie food. (Dubé et al, 2005).

Strengths of this study include the large sample size and large range of BMI values. Limitations include the use of food frequency questions of limited accuracy and a cross-sectional design, which reduces the ability to make causal inferences. It is believed, however, that these findings are unique and that additional longitudinal or experimental studies would be helpful in further understanding the link between obesity and depression.

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Table 1
Demographic Characteristics, BMI, PHQ, and Frequency of Consumption of Different Foods

Age (yr)	52.4	(6.6) *
% White	81.2	
Education (%)		
High school or less	18.3	
> High school < college	57.0	
College graduate	24.7	
BMI	33.4	(7.7)
PHQ Depression Score	5.06	(4.7)
Frequency of Consumption (times/day)		
High-calorie sweets	1.77	(1.33)
High-calorie nonsweets	7.11	(2.78)
Low-calorie foods	2.81	(1.25)

* Table entries are mean ($\pm$ SD) or %.

Table 2
Associations of BMI, Depressive Symptoms, and Reported Consumption of Sweet, Nonsweet, and Low-Calorie Foods ^a

Food Category	Depressive Symptoms		BMI	
	Bivariate	Multivariate	Bivariate	Multivariate
High-calorie sweet	0.01 **	0.012 **	-0.003	-0.005 *
High-calorie nonsweet	-0.013	-0.018 **	0.013 **	0.015 **
Low-calorie foods	-0.04 ***	-0.027 ***	-0.027 ***	-0.024 ***

^a Table entries are nonstandardized regression coefficients; all analyses control for energy intake. Multivariate analyses include BMI, depressive symptoms, and energy intake.

*
p < 0.05

**
p < 0.01

p < 0.001