



Associations between Depressive Symptomatology, Diet, and Body Mass Index among Participants in the Supplemental Nutrition Assistance Program



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ABSTRACT

Background Participation in the Supplemental Nutrition Assistance Program (SNAP) has been shown to increase food security, or access to adequate food; however, SNAP participation has also been associated with obesity among certain demographic groups (eg, women, but not men and children), possibly due to poorer dietary quality. Depressive symptomatology is an understudied factor, which is associated with obesity across the lifespan.

Objective This study examined the relationship between depressive symptomatology, dietary quality, and body weight among a sample of SNAP participants (n=639).

Design The analysis was cross-sectional; survey data were collected in May to December 2011 by trained data collectors.

Participants/setting Adults who self-identified as the primary food shopper of the household in two predominantly low-income African-American neighborhoods characterized as “food deserts” in Pittsburgh, PA, were recruited to participate in this study. **Measures** Dietary quality was calculated using the US Department of Agriculture’s Healthy Eating Index-2005. Body mass index (BMI; calculated as kg/m²) was based on objective measurements taken by the interviewer. Current depressive symptomatology was assessed by a trained interviewer using the Patient Health Questionnaire-2.

Statistical analyses performed Descriptive statistics (means and percentages); two multivariate ordinary least-square regression analyses predicting BMI and dietary quality from depressive symptomatology while controlling for sociodemographic factors and food insecurity were performed.

Results Depression was a strong and statistically significant predictor of both dietary quality and BMI; higher score in depressive symptomatology was associated with lower scores in dietary quality ($\beta=-1.26$; $P<0.0001$). A higher score in depressive symptomatology was associated with higher BMI ($\beta=.63$; $P=0.0031$).

Conclusions These findings show that depressive symptomatology is significantly associated with weight-related outcomes and suggests that understanding the risk of depression among SNAP participants could be important to understanding the relationships among SNAP participation, diet, and weight. The association between depressive symptomatology, elevated BMI, and lower dietary quality among low-income, primarily African-American residents living in a food desert suggests the potential for mental health interventions to have broader benefits in this population. However, the directionality of this association is unclear and improving diet and reducing weight might also improve mental health symptoms. Additional longitudinal studies should assess these possibilities.

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ALTHOUGH MORE THAN ONE-THIRD (34.9%) OF US adults are obese,¹ disparities exist in the prevalence of obesity across socioeconomic status (SES).²⁻⁴ For example, 42% of women living in low-income households (ie, <130% of the poverty line) are obese compared to 29% of women living in households well above the poverty line,⁵ and the rate of weight gain among those

who are already overweight is fastest among those with the lowest income.³ Other SES-related indicators, including low wages⁶ and economic hardship (eg, having less than enough money for one’s needs),⁷ are also associated with body mass index (BMI; calculated as kg/m²) and higher risk for obesity.

Interestingly, participation in the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food

Stamp Program, has been associated with obesity among women.⁸ SNAP participation is an indicator of SES because it is based on gross and net income (for families with at least one elderly or disabled member it is based just on net income). Participation in SNAP has been shown to increase food security (ie, access to enough food for all members at all times of the year).^{9,10} Yet, in a recent literature review, DeBono and colleagues⁸ suggest that there is growing evidence for a positive association between SNAP participation and obesity in women, especially those who are long-time program participants, although the data fall short of what is needed for causal inference.⁸ Data across a number of studies suggest that SNAP participants consume more sugar-sweetened beverages, less fruit, more total fat and added sugars, and more excess calories than non-participants.¹¹⁻¹⁴

An intriguing but understudied factor may be the role of depression as a possible contributing factor to obesity among SNAP participants, given research documenting a link between low SES and depression during the life course.^{15,16} For example, in a meta-regression analysis that looked across SES groups, low-SES individuals had almost twice the odds of being depressed compared to their high-SES counterparts (odds ratio=1.81; 95% CI 1.57 to 2.10; $P<0.001$).¹⁶ This study also showed that depression increased the odds for developing obesity by almost 60% (odds ratio=1.58; 95% CI 1.33 to 1.87; $P<0.001$).¹⁶

There is also robust evidence that individuals experiencing food insecurity have higher rates of depression compared to their food-secure counterparts.¹⁷⁻²⁴ Although a number of studies of SNAP participants have posited stress and depression as important to diet and weight,²⁵⁻²⁷ no study, to our knowledge, has tested the associations between depression and weight outcomes while controlling for food insecurity among SNAP participants. Almost all the studies to date that have looked at associations between depression and diet have examined whether consumption of specific nutrients predicts risk of depression (eg, n-3 fatty acids are associated with lower risk of depression among adults).²⁸⁻³⁰ Only one study among a low-income cohort suggested that higher dietary quality was associated with reduced symptoms of depression.³¹ Others have tested the relationship between dietary patterns and obesity and shown that certain dietary patterns (eg, high intakes of fruit, vegetables, fish, and whole grains) are associated with a reduced depression risk.³²⁻³⁴ However, a plethora of laboratory studies also suggest that depression is associated with increased consumption of palatable food rich in fat and sugar, given that these foods have an anxiolytic effect.³⁵⁻³⁷ This study builds on prior work by testing the hypothesis that depressive symptomatology will be associated with two weight-related outcomes among SNAP participants. Specifically, it examines dietary quality as measured by the Healthy Eating Index-2005 (HEI-2005) (ie, an indicator that assesses conformance to the 2005 Dietary Guidelines for Americans³⁸) and measured BMI. To our knowledge, this is the first study to examine these relationships among SNAP participants; therefore, we begin to address a key gap in the literature by examining weight-related outcomes in low-income populations. Because SNAP participants are a group that can be identified and accessed, these analyses might shed light on potential avenues for intervention.

METHODS

Study Design and Sample

The Pittsburgh Hill/Homewood Research on Eating, Shopping and Health (PHRESH) study is a 5-year study of a cohort of 1,372 residents living in “food deserts.” These food deserts are approximately 4 miles from one another in the City of Pittsburgh and have poor access to healthy food options.^{39,40} Both neighborhoods consist of populations that are predominantly low-income and African-American. Baseline data were collected in May through December 2011 from households that were randomly selected from a complete list of addresses obtained from the Pittsburgh Neighborhood and Community Information System, which houses neighborhood-level data for the City of Pittsburgh. Parcel data were merged with Allegheny County Office of Property Investment data to identify residential addresses, which were then cross-referenced with postal service data to remove vacant properties. A random selection of 2,900 households was chosen from these data.

Eighteen trained data collectors who themselves were neighborhood residents went door-to-door to enroll households after local publicity in church bulletins, community-based organizations and groups, posters in businesses, and postcards that were mailed to each of the randomly selected addresses. Data collectors were able to speak with an adult and identify the address as a residence for 1,956 households (67% of all selected addresses). Of those households, 1,649 were eligible to participate (ie, the primary food shopper was 18 years or older and available) and 1,434 (87%) agreed to participate in the study. Of those households who participated, surveys with large amounts of missing data (>20%) were considered unusable (4%).

Data collectors interviewed the main food shopper of the household, who was 18 years or older, using a computer-assisted personal interviewing method. For sensitive questions, including annual household income and participation in federal assistance programs, participants were given the option of using self-administered interviewing methods instead. Specifically, interviewers provided two example questions as a means of “training” the respondent and then turned the screen toward the respondent. When the questions were complete, the respondent turned the computer back to the interviewer. Interviewers also measured height and weight of the main food shopper at the conclusion of the interview and administered a 24-hour dietary recall. Approximately 1 week later, data collectors administered a dietary recall a second time via telephone. The original study protocol specified that dietary data would be collected during 1 weekend day and 1 weekday. However, scheduling proved to be too difficult and only 32% of the sample completed the dietary recall according to this schedule. Most of the sample completed both recalls during weekdays (60%), and 8% during weekends. All study protocols were approved by the RAND Human Subjects Protection Committee. In addition, all study participants were adults (ie, 18 years and older) and provided oral informed consent before the interview.

Measures

SNAP Participation. Participation was measured with a single question (Did any member of your household receive

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