



Food insecurity, diet quality and body mass index of women participating in the Supplemental Nutrition Assistance Program: The role of intrapersonal, home environment, community and social factors

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ABSTRACT

Obesity is a public health problem that disproportionately affects low-income populations. Moreover, participation in Supplemental Nutrition Assistance Program (SNAP) has been associated with obesity among low-income women. The goal of this study was to determine the impact of intrapersonal, home environment, community and social factors on diet quality and body mass index (BMI) of low-income women participating in SNAP. This study also aimed to examine the role of these factors in mediating the relationship between food insecurity and diet quality, and BMI. A total of 152 women receiving SNAP benefits were recruited from low-income neighborhood centers and housing communities, and administered a demographics questionnaire, the United States adult food security scale, food frequency questionnaire, and multi-dimensional home environment scale (MHES). They also were measured for height and weight to calculate BMI. The Dietary Guidelines Adherence Index 2015 was used to measure diet quality. Regression analyses were conducted to determine the MHES subscales that were significant predictors of diet quality and BMI. The Preacher and Hayes mediation model was used to evaluate the mediation of the relationship between food insecurity and diet quality, and BMI by the MHES. Emotional eating resistance and favorable social eating behaviors were positively associated with diet quality; whereas emotional eating resistance, lower availability of unhealthy food at home, neighborhood safety and favorable social eating behaviors were inversely associated with BMI in women participating in SNAP. The MHES significantly mediated the relationship between food insecurity and BMI. These results emphasize the importance of intrapersonal, home environment, community and social factors in mediating the relationship between food insecurity and BMI in low-income women.

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1. Introduction

The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, is the largest food assistance program in the United States (U.S.). Households with a gross income of $\leq 130\%$ of the Federal Poverty Level are eligible to receive benefits from this program to purchase food (Supplemental

Nutrition Assistance Program,). In contrast to the Special Supplemental Nutrition Program for Women, Infants and Children (Special Supplemental Nutrition Program for Women, 2014), SNAP does not require purchasing of foods that are aligned to the Dietary Guidelines for Americans. Moreover, adult SNAP participants have been reported to consume diets of lower quality characterized by fewer whole grains and more red meat, potatoes and fruit juice as compared to income-eligible nonparticipants (Leung et al., 2012). Additionally, the majority of research has shown that women participating in SNAP have a greater risk for obesity (Chen, Yen, & Eastwood, 2005; DeBono, Ross, & Berrang-Ford, 2012; Gibson, 2003, 2006). However, factors contributing to poorer diets and greater obesity prevalence among SNAP participants have not been

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thoroughly examined.

The Social Ecological Model (SEM) has been used as the theoretical framework for understanding health behaviors in the general population (McLeroy, Bibeau, Steckler, & Glanz, 1988). The SEM posits that individuals acquire behaviors by a dynamic interaction between intrapersonal and environmental factors, including the home, community and social environment (McLeroy et al., 1988). The intrapersonal component was the first aspect to be explored within the context of the SEM. Factors to be studied within this domain included emotional eating resistance, self-efficacy, healthy eating attitudes and mindless eating. Eating in response to emotion and environmental cues, rather than hunger, was selected as it negatively impacts diet quality and body mass index (BMI) of low-income women (Cahill, Freeland-Graves, Shah, Lu, & Klohe-Lehman, 2009). Self-efficacy, the confidence in one's abilities to engage in a certain action (Bandura, 1994), also is as a key predictor for adopting healthful practices associated with weight loss (Annesi, 2007; Hinton & Olson, 2001) and management (Chang, Nitzke, Brown, & Baumann, 2011). Another critical factor is a positive attitude towards healthy eating, as this has been strongly correlated to BMI of low-income women (Acheampong & Haldeman, 2013). Finally, mindless eating has been associated with consumption of greater than intended quantities of food (Bellisle, Dalix, & Slama, 2004), and also may influence diet quality and weight status. The second major component of the SEM considered was the home environment, as it plays a vital role in shaping health behaviors. The home is critical for nutrition, as a major portion of energy intake is accounted by home food sources (Smith, Ng, & Popkin, 2013), and the type of foods available are key determinants of dietary intake (Cahill, Freeland-Graves, Shah, & Lu, 2010). Gorin et al. have shown that availability of healthy foods at home was lower, and that of unhealthy foods was higher, in overweight individuals when compared to those who were normal weight (Gorin, Phelan, Raynor, & Wing, 2011). Additionally, perceptions of the community environment, such as physical characteristics of the built environment and neighborhood safety were evaluated in this research since low-income populations often reside in neighborhoods that may limit opportunities for physical activity (Adamus-Leach, Mama, O'Connor, & Lee, 2012; Moore, Diez Roux, Evenson, McGinn, & Brines, 2008). Finally, social factors such as regulation of family meals, social eating, social support, and descriptive norms for healthy eating were included due to their associations with dietary behaviors (Pelletier, Graham, & Laska, 2014). Until date, limited research has applied the SEM to understand dietary behaviors and body mass index of women participating in SNAP.

Food insecurity is a public health problem that affects economically disadvantaged households (Anderson, 1990). Although the SNAP has been successful in reducing food insecurity in the U.S., more than half of SNAP-participating households remain food insecure (Mabli,). Since food insecurity has been shown to adversely affect dietary intake and weight status in women (Dinour, Bergen, & Yeh, 2007; Franklin et al., 2012; Ivers & Cullen, 2011; Jones & Frongillo, 2006; Larson & Story, 2011; Martin & Lippert, 2012; Tarasuk & Beaton, 1999; Townsend, Pearson, Love, Achterberg, & Murphy, 2001), it is important to explore mediators of this relationship. Willis et al. have provided evidence for non-nutritional mechanisms that link food insecurity and weight status in children (Willis & Fitzpatrick, 2016). However, relatively little is known about the pathways by which food insecurity impacts dietary intake and weight status in women. Therefore, the purpose of this study was to assess the influence of intrapersonal, home environment, community and social factors on diet quality and BMI of female SNAP participants in Central Texas. This objective tested the hypothesis that favorable intrapersonal, home

environment, community and social factors will be associated with better diet quality and lower BMI in women. A secondary objective was to explore how these SEM-based factors mediated the relationship between food insecurity and diet quality, and BMI in women participating in SNAP. Additionally, the mediating role of diet quality between food insecurity and BMI was explored.

2. Materials and methods

2.1. Study design and participants

A convenience sample of 152 women was recruited for this cross-sectional study. Recruitment was conducted in a total of nine low-income neighborhood centers and housing communities in Central Texas. Anthropometric measurements and questionnaire administration were conducted at these sites. Primary enrollment criteria included: participation in SNAP program, ages 18–50 years old, and Hispanic, non-Hispanic White or African-American ethnicity. Participation in SNAP program for any other ethnicity was estimated to about 1% in Texas (Grey,). In order to focus on the predominant ethnic groups, this factor was used as an enrollment criterion.

This study was granted an exempt status by the Institutional Review Board at The University of Texas at Austin, based on 45 46.101 (b) (Special Supplemental Nutrition Program for Women, 2014) Code of Federal Regulations. Participation in the study was voluntary and informed consent was obtained from all.

2.2. Instruments and data collection

Participants were measured for height and weight, and administered the demographics questionnaire, food frequency questionnaire (FFQ), and Multi-dimensional Home Environment Scale (MHES). In addition, women completed the U.S. Adult Food Security Scale. A monetary incentive was provided to participants to complete the study. All the questionnaires were made available in English and Spanish. Bilingual graduate and undergraduate research assistants were involved in the data collection process.

2.3. Anthropometrics

A stadiometer (Health O Meter, McCook, Illinois) and digital weighing scale (Health O Meter, McCook, Illinois) were utilized to measure height and weight, respectively. BMI, calculated as weight (kg)/height (m)², was used to group women according to their weight status. A BMI of ≤ 24.9 kg/m², 25–29.9 kg/m², and ≥ 30 kg/m² indicated healthy, overweight and obese status, respectively.

2.4. Demographics

A demographics questionnaire (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007) tailored to a population of low-income women was modified to collect information pertaining to age, household size, number of children, ethnicity, monthly income, and amount of monthly benefits received from SNAP.

2.5. Food frequency questionnaire

A 95-item FFQ that has been evaluated for validity and reliability in a sample of women in SNAP was used to collect dietary intakes (Sanjeevi, Freeland-Graves, & George, 2017). The mean validity correlation between the FFQ and reference instrument was 0.61; whereas, the test-retest correlation between the two FFQ administrations was 0.66. The FFQ was based on a reference period of one week, with frequency options ranging from never or less than once

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