



Auxiliary measures to assess factors related to food insecurity: Preliminary testing and baseline characteristics of newly designed hunger-coping scales

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ABSTRACT

The objective of this paper is to describe the development and preliminary testing of new scales to assess hunger-coping behaviors in a very low-income population. Very low-income adults (≥ 19 years), caregivers to at least one child ($n = 306$) completed a survey in a community setting (e.g., libraries). The survey included novel items assessing hunger-coping behaviors (e.g., trade-offs to purchase food, strategies to stretch and obtain food), food insecurity status, and physiological hunger. Internal consistency of hunger-coping scales, one-way ANOVAs, post-hoc analyses, Spearman's correlations among variables. Respondents were 75% female, 51% African American, 34% White, and 15% Hispanic, and 73% earned $< \$20,000/\text{year}$. Four scales emerged: *hunger-coping trade-offs*, *financial coping strategies*, *rationing coping strategies*, and *physiological adult hunger symptoms*. All scales demonstrated acceptable internal consistency ($\alpha/\text{KR-20} = 0.70\text{--}0.90$). Predictive, construct, and content validity were demonstrated by correlations between hunger-coping scales and food insecurity (FI), measured with the USDA 6-item HFSSM ($r_s = 0.42\text{--}0.68$, $p_s < 0.001$). Higher levels of *hunger-coping trade-offs* ($F(2,297) = 42.54$, $p < 0.001$), *financial coping strategies* ($F(2,287) = 70.77$, $p < 0.001$), and *rationing coping strategies* ($F(2,284) = 69.19$, $p < 0.001$), corresponded with increasing levels of FI. These preliminary results support use of newly developed hunger-coping scales in a very low-income population and can compliment traditional food security measures to inform hunger prevention policy and programming.

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1. Introduction

One out of every seven (14.3%) households in the United States (U.S.) was food insecure in 2013, meaning members did not have reliable access to sufficient affordable and nutritious food (Coleman-Jensen et al., 2014). A growing body of research shows relationships between food insecurity and poor health and dietary outcomes among certain populations such as adult women and Hispanic families (Cook et al., 2004; Dave et al., 2009; Leung et al., 2012; Olson, 1999; Larson and Story, 2011). Food insecure households are also at risk for poor physiological, cognitive and emotional development and lower overall quality of life (Cook and Frank, 2008; Rose-Jacobs et al., 2008). Accordingly, food insecure populations suffer disproportionately from various chronic diseases (e.g., hypertension, hyperlipidemia, and diabetes) (Seligman et al., 2010).

Food insecurity may be a component related to weight gain and poor health outcomes within the broader environmental, social, and political context of poverty (Finney Rutten et al., 2010). Evidence exists supporting a coexistence of obesity and food insecurity (Adams et al., 2003; Dinour et al., 2007; Townsend et al., 2001; Franklin et al., 2012;

Pan et al., 2012), possibly due to reliance on low-cost foods, which are often energy dense and of poor nutrient quality (Nord and Golla, 2009), although the mechanisms of this relationship are still debated. In order to better understand and develop appropriate interventions for food insecure populations, behavioral mechanisms and potential mediators should be considered (Finney Rutten et al., 2010). The United States Department of Agriculture (USDA) Household Food Security Survey Module (HFSSM) is a widely used 18-item measurement tool that is also available in a shortened, 6-item format (Bickel et al., 2010). While the HFSSM is useful in describing ranges of food security (high, marginal, low, and very low) (United States Department of Agriculture, Economic Research Service, 2014), it does not assess behavioral hunger-coping strategies which may be occurring in food insecure populations. Coping strategies may include behaviors such as rationing food supplies, altering food purchasing habits, and skipping bills, and could subsequently buffer food insecure households from physiological hunger (Finney Rutten et al., 2010; Dietz, 1995).

Few studies have described and assessed potential behavioral coping strategies among the food insecure and have mostly been qualitative in nature. Although some hunger coping items were tested in the 1995

assessment of household food security in the U.S., along with some alternative HFSSM items, these items were not retained since they did not meet statistical criteria for inclusion (Hamilton and Cook, 1997). However, since then, qualitative studies have elaborated on these coping behaviors. One study substantiated coping strategies identified by nutrition educators among low-income audiences through focus groups (Kempson et al., 2003). Another study probed interviewees on 78 similar food acquisition practices and further categorized items into six risk types: financial, food safety, illegal/regulatory, nutritional, physical, and none (Anater et al., 2011). A third study used information gathered in focus groups to survey clients with children at food pantry sites on food coping strategies and related these to different levels of household food security status in a small sample (Wood et al., 2007). These studies have helped lay the theoretical groundwork necessary to conceptualize the novel construct of hunger-coping strategies for the development of the current survey (Kincheloe and McLaren, 2002; Wood et al., 2007). There is a need to develop and preliminarily test complementary measures to the USDA HFSSM, that assess a wider range of behaviors experienced by low-income, food insecure populations.

There is limited research that has examined the development and testing of survey items assessing coping strategies among a low food secure population. The goal of the current study is threefold: (1) to describe the development of a new measure of hunger-coping behaviors; (2) to preliminarily test the new measure of hunger-coping; and (3) to test the relationship of hunger-coping behaviors with food insecurity and physiological hunger. Some of the coping behaviors may be positive, and protective of food insecurity, while others may be more risky, and exacerbate the experience of food insecurity.

2. Methods

Data are from the 2014 [BLIND] Plan, a large three-year multi-component, community-based initiative targeted at reducing hunger. The vision of the [BLIND] Plan is to eliminate hunger in the [BLIND] metro area and is specially aimed to reduce hunger and food insecurity over the three-year period. The overall [BLIND] Plan Survey consisted of 100 items, which assessed various topics such as nutrition assistance program participation, food insecurity, hunger-coping behaviors, hunger symptoms, sociodemographics, and dietary patterns. Items were newly developed, modified, or selected from existing surveys. The survey tools and constructs were developed from untested instruments, qualitative data, and newly developed items. An external expert in the area of food insecurity reviewed the measurement tool and provided input throughout the data collection and analysis. The survey was administered via Apple iPad minis (survey was created electronically using Filemaker Pro (Santa Clara, CA)) ($n = 247$) and pencil-and-paper ($n = 59$) if specifically requested by participants, with English and Spanish versions available. During the first year of the project, the survey was administered to a sample ($n = 306$) of participants recruited from February through June of 2014 in a medium-sized Midwest City. Purposeful sampling occurred at venues in areas where low-income families lived and frequented (e.g., public libraries, food pantries). Eligible participants were 19 years of age and older, a parent or primary caregiver to at least one child (aged 18 or younger) living in the same household 50% of the time or more, and English- or Spanish-speaking. Parents were the targeted sample, given the emphasis on addressing childhood poverty in the [BLIND] Plan. All survey participants received a \$7 gift card to a large chain superstore. Institutional Review Board (IRB) Approval for all components of this data collection was obtained from the [BLIND] IRB.

2.1. Measures

2.1.1. Sociodemographics and family characteristics

Sociodemographics and family characteristics assessed included race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic/

Latino, American Indian, and all other races/ethnicities), age (18–29; 30–39; 40–44; 45–49; 50–64; 65 and older) sex (male vs. female), education (no formal education; grade school; high school or equivalent; vocational, business, or trade school; 2-year junior or community college; 4-year college or university; graduate or professional school), income (none; \$5000 or less; \$5000–\$10,000; \$10,001–\$15,000; \$15,001–\$20,000; \$20,001–\$25,000; \$25,001–\$30,000; \$30,001–\$35,000; \$35,001–\$50,000), Supplemental Nutrition Assistance Program participation (yes vs. no).

2.1.2. Hunger-coping items

New and modified items to assess hunger-coping were developed based on previous qualitative work (Kempson et al., 2003; Anater et al., 2011) and preliminary surveys (Wood et al., 2007). In addition, some items were modified from the Hunger in America Survey, which is conducted every four years with partner agencies in the Feeding America network (Feeding America). Five items included Likert scale responses (1 = never–5 = always) and assessed whether families make sacrifices to afford food (e.g., choosing between paying for food and paying for rent/mortgage). In addition, twenty items included yes/no responses and assessed various behaviors that individuals and families may engage in order to buffer the experience of food insecurity and physiological hunger (e.g., growing food in a garden, limiting intake or locking food up to save it, buying the cheapest food possible).

2.1.3. Physiological hunger symptoms

Finally, six items assessed adult hunger symptoms with yes/no responses to items such as feeling tired or cranky due to lack of food.

2.1.4. Household food security

The USDA HFSSM 6-item module (Bickel et al., 2010) was used to assess food security status and classified households into three categories: High and marginal food security, low food security, and very low food security.

2.2. Analysis

Data were analyzed using SPSS, version 22.0 (SPSS, Inc., Chicago, Illinois). Percentages and mean \pm standard deviations were used to describe hunger-coping items and sociodemographics among all participants. Alpha level for statistical significance was set at 0.05.

Items with Likert-scale responses were tested separately from those with binary response options using Cronbach's alphas for continuous data. Scales were grouped based on theoretical background supporting different types of hunger-coping. Binary response items were further grouped a priori for conceptual relationships, then measured for internal consistency using Kuder-Richardson Formula 20 (KR-20) (Knapp, 1991; Gleason et al., 2010). In order to test preliminary psychometrics, we first tested construct validity through inter-scale correlation of the newly developed scales using Spearman correlations, given non-normal distribution of the data. In addition, content validity was tested with the correlation between the scales and the HFSSM 6-item derived food insecurity level (e.g., high or marginal food security, low food security, and very low food security).

In order to describe differences by level of food security and self-reported hunger-coping and hunger symptom scales, separate one-way analyses of variance (ANOVA) were conducted. Similarly, one-way ANOVAs were conducted to test for food insecurity group differences in adult hunger symptoms (with the same procedures for post-hoc analyses). Tukey's honest significant difference post hoc tests were conducted between each of the following: High or marginal food security versus low food security, high or marginal food security versus very low food security, and low food security versus very low food security to determine significant differences.

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