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Short Report

Test–retest reliability of a questionnaire measuring perceptions of neighborhood food environment



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ABSTRACT

There is a lack of validated and reliable instruments on perception of the food environment, in particular for rural environments. We estimated the test–retest reliability of a questionnaire assessing perceptions of the food environment. A total of 101 primary food shoppers in South Carolina were interviewed by phone to assess their perceptions of the food environment and presence of different food outlet types in their neighborhood. The survey was repeated approximately one month after the initial administration. The intra-class correlation (ICC) and Phi coefficient are reported as measures of reliability. The majority of questions on perceptions of the neighborhood food environment appear highly reliable (ICCs range from 0.55 to 0.71), including the 3-item scale on healthy food availability (ICC 0.71). Compared to participants in rural areas, those in urban areas demonstrated better reliability for questions on opportunities to purchase fast food and perceived presence of a supercenter. More research is needed to evaluate potential rural–urban differences in reliability.

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1. Introduction

Recent research suggests that an individual's perception of the food environment is associated with dietary intake (Hearst et al., 2012; Keita et al., 2011; Sharkey et al., 2010; Zenk et al., 2005). Several measures have been developed to characterize the food environment including observations of local neighborhoods, geographic information system (GIS)—based measurements, and self-reported perceptions of the food environment. Studies have shown that perceptions of food environment are reliable but not identical compared to GIS-based measurements (Echeverria et al., 2004; Moore et al., 2008a; Freedman and Bell, 2009). Subjective reports may provide information on the foods actually available and of interest to residents which are not captured by data on the locations of facilities.

The most well-known self-report instrument on the food environment was developed for the Multi-Ethnic Study of Atherosclerosis (MESA) to measure the perceived availability of healthy

food options and lack of access to adequate food shopping within a person's neighborhood (Echeverria et al., 2004; Mujahid et al., 2007). Test–retest reliability of a 6-item healthy food access scale was assessed by Echeverria et al. (2004) in a pilot study of 48 volunteers living in New York City. The scale was subsequently refined to include only three items by Mujahid et al. (2007) in a subsample of the MESA study, which included 120 individuals in three study sites (Maryland, North Carolina, and New York).

Both aforementioned studies (Echeverria et al., 2004; Mujahid et al., 2007), as well as several others (Moore et al., 2008a, 2008b; Freedman and Bell, 2009; Keita et al., 2011) have been conducted in urban environments. To the best of our knowledge, only one has compared the perceptions of food environments of rural, suburban, and urban food pantry clients in Iowa and found that rural clients were significantly more likely to perceive their community as having an inadequate number of grocery stores or supermarkets (Garasky et al., 2004).

Several studies have collected data on perceived presence of specific food store outlet types in the neighborhood to evaluate the food environment (Gustafson et al., 2011; Zenk et al., 2009). However, no studies have been performed to assess the reliability of questions on perceived presence of specific food store outlet types.

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This study sought to estimate the test–retest reliability of a questionnaire assessing self-reported perceptions of the food environment including the access, availability, and quality of healthy food options, and the perceived presence of specific food outlets in the neighborhood. We examined the test–retest reliability overall and examined whether there were any differences by urban–rural classification.

2. Methods

2.1. Study population and sub-study sample

In 2010, we conducted a cross-sectional study of residents of an eight-county region in South Carolina. Using a geographically-based sampling scheme, we randomly sampled 2477 residential listed landline phone numbers and sent out introductory letters. Recruitment calls were made between April and July 2010 and a total of 968 adults participated in the telephone survey. For the reliability sub-study, we randomly selected 155 respondents from the main sample and repeated the phone interview about one month (Mean=35.4 days, SD=8.2 days) after the initial survey. In the end, 101 persons completed the reliability study, 7 refused, 42 could not be reached, and 5 were ineligible (not in service or no longer living at the number), yielding a response rate of 67.3%. All the interviewers were from the Survey Research Laboratory (SRL) at University of South Carolina and all were highly trained. The interviewer conducting the second interview may have differed from the interviewer conducting the initial interview. In present study, we define urban and rural residents using the 2010 Census-based designation of urban and rural area (2010 Census urban and rural classification and urban area criteria, 2010). The urbanized areas (of 50,000 or more people) were considered as urban areas. Urban clusters (of at least 2500 and less than 50,000 people) and rural areas were considered as rural areas in this study. The protocol was reviewed and approved by the Institutional Review Board (IRB) at University of South Carolina, and respondents gave verbal consent.

2.2. Questionnaire administration

Five questions on perceptions of the food environment previously developed for the MESA Neighborhood Study (Mujahid et al., 2007) were used and included (a) availability of

fresh fruit and vegetables, (b) quality of fresh fruit and vegetables, (c) availability of low fat products, (d) opportunities to purchase fast food in the neighborhood, and (e) access problems for food shopping (Table 1). As previously used in other food environment research, the neighborhood was defined as within a 20-min walk or one mile (1.6 km) from home (Echeverria et al., 2004; Mujahid et al., 2007). The responses to above questions were coded on a Likert scale ranging from 1 to 5 (see Table 1). To create a composite healthy food availability scale in accordance with Mujahid et al. (2007), we computed the average of three of the five items (i.e. availability of fresh fruit and vegetables, quality of fresh fruit and vegetables, and availability of low fat products).

We also asked the respondents whether they had certain types of food retail outlets available within their neighborhood (Table 1). This set of nine questions was newly developed for our survey. The same definition of the neighborhood was used. Response options were simply “yes” or “no”. The list of outlet types included supercenter, supermarket, smaller grocery store, convenience store, specialty store, drug store or pharmacy, dollar variety, franchised fast food restaurant, and sit down restaurant.

2.3. Statistical analysis

The test–retest reliability on questions of perceptions of food environment was estimated using ICC described by Shrout and Fleiss (1979). ICC values range between 0 and 1, > 0.8 is considered excellent, 0.6–0.8 good, 0.4–0.6 moderate, and < 0.4 as poor agreement (Landis and Koch, 1977). The test–retest reliability on questions of perceived presence of food outlet was assessed using Phi coefficients (Cramer, 1946) and interpreted using the same qualitative categories as for the ICC. Because of likely differences in the foodscape for persons living in urban vs. rural areas, the reliability analysis was repeated after stratification. All analyses were performed in SAS 9.2 (Cary, NC).

3. Results

Sample characteristics are presented in Table 2. The mean age of our sample was about 60 years and approximately 80% of the respondents were female. Two-thirds were non-Hispanic Whites and one third of respondents were African Americans and other minority race/ethnic groups. Approximately 75.5% of the respondents

Table 1

Questions on perceptions of food environment in the telephone survey questionnaire^a.

Perceptions of the food environment^b

1. A large selection of fresh fruits and vegetables is available in my neighborhood.
2. The fresh fruits and vegetables in my neighborhood are of high quality.
3. A large selection of low fat products is available in my neighborhood.
4. There are many opportunities to purchase fast foods in my neighborhood such as McDonald's, Taco Bell, KFC and takeout pizza places etc.
5. How much of a problem would you say that lack of access to adequate food shopping is in your neighborhood?

Perceived presence of food retail outlet^c

Which of the following stores, if any, are located in Your Neighborhood:

1. A supercenter such as Wal-Mart or Target.
2. A supermarket such as Food Lion, Kroger, Publix, or Piggly Wiggly.
3. A smaller grocery store.
4. A convenience store with or without a gas station attached.
5. A specialty store such as ethnic specialty store, meat market, seafood market, green grocer, or bakeries.
6. A freestanding drug store or pharmacy Store such as CVS, Rite-Aid, Eckerd's, or Walgreen's
7. A dollar variety, dollar general, dollar store, or dollar tree
8. A franchised fast food restaurant including places like McDonalds, Subway, or Taco Bell
9. A sit down restaurant or buffet restaurant

^a For each of the following statements, please think of your neighborhood as the area within a 20 min walk or about a mile from your home.

^b The responses to above questions were coded on a Likert scale ranging from 1 to 5 (1=strongly agree, 2=agree, 3=neutral, 4, disagree, 5=strongly disagree) for question #1–#4 and ranging from 1 to 4 (1=very serious problem, 2=somewhat serious problem, 3=minor problem, 4=not really a problem) for question #5.

^c Response options were simply “yes” or “no”.

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