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Using the Community Assessment for Public Health Emergency Response (CASPER) to assess barriers to healthy eating and active living in a low-income community

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ABSTRACT

Insufficient physical activity and unhealthy eating behaviors are major contributors to the obesity epidemic in the United States. Identifying health behaviors and disparities in underserved communities is needed to guide the development of targeted interventions. The Community Assessment for Public Health Emergency Response (CASPER) is a set of tools designed for public health emergencies, but the utility of CASPER in non-emergency settings has not been explored. The purpose of this study was to use CASPER to obtain information on household-based behaviors of and barriers to fruit/vegetable consumption and physical activity, and explore the utility of these methods for future health assessments. Cross-sectional survey data included households (n = 100) in a low-income neighborhood. Half of adults did not meet recommendations for fruit/vegetable consumption and 20% reported no physical activity during the previous week. Cost was significantly associated with healthy eating and physical activity in our community. Four primary advantages of using CASPER methodology included a user-friendly CDC toolkit, yield of a representative community sample with a relatively low sample size, low-cost/low-tech requirements for implementation, and the strengthening of an academic-practice-community partnership. Our work demonstrates the utility of CASPER for assessing healthy living in a geographically-defined community where household health behaviors and barriers are unknown.

1. Introduction

The steep rise in the prevalence of obesity and obesity-related health outcomes, such as diabetes mellitus and cardiovascular disease, is a major public health problem. More than two-thirds of adults are overweight or obese in the United States (Ogden, Carroll, Kit, & Flegal, 2014), and the associated increasing health care expenditures and loss of productivity are substantial costs to society (Finkelstein, Ruhm, & Kosa, 2005). Insufficient physical activity and unhealthy eating behaviors are major contributors to this epidemic (Economos, Hatfield, King, Ayala, & Ann Pentz, 2015). Recent efforts to combat the prevalence of obesity have focused on societal- and policy-level prevention, including food availability in schools (Novak & Brownell, 2012; Story, Nanney, & Schwartz, 2009), physical activity programs at the workplace (Institute of Medicine [IOM], 2012), and community access to and pricing of healthy food (Glanz & Yaroch, 2004; Novak & Brownell, 2012). Nevertheless, the Institute of Medicine notes that "the ultimate success of changes at these levels depends on the extent to which the changes reach and are adopted and sustained by individuals and families (IOM, 2012)."

The household environment plays a pivotal role in the obesity epidemic. Familial patterns of obesity may result from shared genetic and environmental factors (Birch & Davison, 2001). Parents act as both decision makers and role models for their children, particularly regarding healthy eating and active living (IOM, 2012). Young children are not only dependent on parents to provide food, but often have food preferences shaped by parental food choices and preferences through social modeling (Birch & Davison, 2001).

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Likewise, parental modeling of sedentary behaviors and the frequency of home- or family-based physical activities may promote or prevent obesity among families (Pocock, Trivedi, Wills, Bunn, & Magnusson, 2010). Therefore, measuring obesity-related factors at the household level is important for tailored prevention efforts.

The Community Assessment for Public Health Emergency Response (CASPER) was designed as a household-based assessment tool for disaster response (Centers for Disease Control and Prevention [CDC], 2012). Previous uses of CASPER have included the rapid assessment of public health emergency needs after the Gulf Coast oil spill (Buttke et al., 2012) and Hurricane Ike (Zane et al., 2010). However, CASPER may be useful in non-emergency settings as well, particularly when the health status of a community is unknown. The purpose of this investigation was to (1) utilize CASPER methodology to assess household-based barriers to healthy eating and active living in a low-income neighborhood, and (2) explore the utility of the CASPER methods for future community work.

2. Methods

2.1. Study design

The Texas Healthy Communities (TxHC) program is designed to implement healthy initiatives for reductions in high-risk health behaviors, health disparities, and chronic disease in communities poised for change (Texas Department of State Health Services, 2011). For this pilot investigation with TxHC, we selected one zip code from a central Texas metropolitan area with a high prevalence of obesity. We developed the survey using a community-based participatory research approach with community members and stakeholders. Then, we used CASPER methods to obtain a representative sample of residents to provide information about healthy living behaviors and barriers.

CASPER is a set of tools for rapid health assessment designed by the CDC in 2009 to provide quick, inexpensive, accurate, and reliable household-based public health information. The key feature of CASPER is a two-stage cluster sampling method to obtain a fixed target sample size of 210 households, regardless of the size of the community. In the first stage, the pre-selected zip code was divided into census blocks according to the U.S. Census Bureau. Thirty census blocks were selected, with their probability proportional to the estimated number of housing units in each cluster (Centers for Disease Control & Prevention, 2012). In the second stage, seven households were selected using sequential sampling on-site by the field team using a detailed map of the census block viewed in GoogleEarth (Centers for Disease Control & Prevention, 2012). The sampling goal was 30 census blocks $\times$ 7 housing units = 210 household interviews.

We planned and conducted our survey in 2015. To execute the health assessment in one working day, 36 individuals comprised 12 field teams. All participated in morning "just-in-time" training and were assigned one of 3 team roles: *knocker* (responsible for knocking on door of selected house, introducing the team, and obtaining informed consent), *collector* (responsible for data collection on iPad or paper survey), and *tracker* (responsible for tracking homes and response rates). Individuals who served in the *collector* role were epidemiology students with additional human subjects and data collection training from public health coursework. The local police department led safety education for the field teams. Once in the community, field teams identified eligible household respondents $\geq$18 years of age who were residents of the selected house and provided verbal consent to participate. According to the CASPER methodology, there is no specific formula for selecting the eligible individual to interview in the selected household (Centers for Disease Control & Prevention, 2012). Of the 204 homes at which a resident answered the door, 100 (49.0%) household interviews were completed; residents at the remaining households declined participation in our study. There were 274 individuals who resided within the 100 sample households. This study was approved by the Institutional Review Board of Baylor University.

2.2. Study participant measures

The household respondent provided sociodemographic information for each member the household. Respondents were asked questions from the Health Information National Trends Survey (HINTS) to report their normal daily consumption of fruit and of vegetables (National Cancer Institute [NCI], 2014). Compared to a 24-h food frequency recall, the 2-question HINTS screener has moderate validity (Pearson correlation coefficient is 0.51 and 0.32, respectively) and strong test-retest reliability (Intraclass correlation coefficient is 0.59 and 0.60, respectively; Yaroch et al., 2012). Not meeting fruit and vegetable consumption recommendations was defined as 2 cups or less of fruit and 2 cups or less of vegetables (USDA & USDHHS, n.d.a, n.d.b). As part of survey development, potential household barriers to healthy eating were identified using empirically supported barriers in the literature as well as those identified by community leaders. Respondents were asked to *Agree* or *Disagree* with seven potential healthy eating barriers, which included cost, time, location, transportation, knowledge, preparation skills, and taste (Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004; Eikenberry & Smith, 2004; Yeh et al., 2008; Kamphuis, Van Lenthe, Giskes, Brug & Mackenbachm 2007).

The International Physical Activity Questionnaire-Short Form (IPAQ-SF) was used to measure moderate and vigorous physical activity ((MVPA) (Craig, Marshall, Sjöström, the IPAQ Consensus Group, & the IPAQ Reliability and Validity Study Group, 2003). Compared to accelerometers, the IPAQ-SF has moderate validity (Spearman correlation coefficient = 0.30) and strong same day test-retest reliability (Spearman correlation coefficient = 0.76), and is recommended for regional, national, and international use (Craig et al., 2003). We assigned moderate activities a metabolic equivalent (MET) value of 4.0 and vigorous activities a MET value of 8.0 (Guidelines for Data Processing & Analysis, 2004). Participants met physical activity guidelines if they reported at least 600 MET-minutes for the previous 7 days (HHS, 2008). Similar to healthy eating barriers, potential household barriers to physical activity were identified using empirically supported barriers in the literature as well as those identified by local leaders. Respondents were asked to *Agree* or *Disagree* with household barriers to active living, such as cost, time, location, transportation, desire, skills, and fatigue, and potential facilitators of active living, such as sidewalks, bicycle lanes, and neighborhood safety (Giles-Corti & Donovan, 2002; Sechrist, Walker, Render, 1987; Taylor, Lawton, & Conner, 2013; Umstattd et al., 2012).

2.3. CASPER evaluation measures

At the conclusion of the data collection day, field team members were asked to participate in a guided group interview to discuss ideas to sustain and improve future CASPER data collections. Guided group interviews were conducted by the lead investigator immediately following community data collection and observation notes were recorded. The group interview included a discussion of ideas to sustain and ideas to improve future CASPER assessments. Analysis of observation notes entailed identification of emerging themes by investigators and subsequent validation of themes by CASPER field teams.