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The relationship between interviewer–respondent race match and reporting of energy intake using food frequency questionnaires in the rural South United States

Jennifer L. Lemacks [b,*], Holly Huye [a], Renee Rupp [a], Carol Connell [a]

[a] The University of Southern Mississippi, 118 College Drive #5172, Hattiesburg, MS 39406-0001, USA
[b] The University of Southern Mississippi, 118 College Drive #5172, Hattiesburg, MS 39406-0001, USA

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ABSTRACT

Objective. The purpose of the observational study was to determine whether interviewer race influences food frequency questionnaire (FFQ) reporting accuracy in a Deep South, largely African American cohort.

Methods. A secondary analysis was conducted to investigate the influence of interviewer race on energy reporting of 319 African Americans who participated in the Mississippi Communities for Healthy Living intervention in May–June 2011, a community-based and USDA-funded project. Reported energy intake was compared to total energy expenditure to identify normal (ENR), under-(EUR) and over-reporters (EOR). Multivariate logistic regression models determined the relationship between race match and energy misreporting, accounting for confounding variables (educational level, health status perception, BMI, gender, and age) identified using chi-square/correlation analyses.

Results. The sample included 278 African Americans with 165 EURs, 26 EORs, and 87 ENRs identified. Logistic regression analyses revealed that there was no relationship between race-matched participants and EUR or EOR; controlling factors, BMI and perceived health status were significant in the model.

Conclusion. This study is the first to our knowledge to examine whether race influences dietary intake reporting which may influence assessment data used for comparison with health outcomes. This may have important implications for research conducted in health disparate populations, particularly rural, Southern populations.

Introduction

Obesity is a major public health issue with higher rates in the Southern US, especially in 'Deep South' states (Alabama, Georgia, Louisiana, Mississippi, and South Carolina) (Centers for Disease Control and Prevention, 2014), and rural areas (Befort et al., 2012). Uniquely, compared to the rest of the nation, Deep South states also have a higher population density of African Americans (Rastogi et al., 2011), who have higher rates of obesity compared to other racial groups (Flegal et al., 2010). Therefore, the representation of African Americans in research is particularly important for the prevention of chronic disease in the South.

Typically, African Americans have been underrepresented in research, which has been attributed to cultural mistrust (Huang and Coker, 2010). Additionally, perceived racial barriers to health care and participation in clinical trials by African Americans, as well as Whites, have been noted in the rural South (Fowler-Brown et al., 2006). Compounded with racial mistrust, perceptions of racial bias may also be an issue for health disparities researchers targeting rural populations in the Deep South due to a pervasive history of slavery and racial segregation/discrimination (American civil rights movement, 2014).

Community interventions, focused on improving nutrition and physical activity behaviors, have shown to be promising for improving the health of African Americans and preventing chronic disease (Lemacks et al., 2013), which may also be relevant for other ethnic groups residing in the rural South. Due to the nature of community-engaged research, requiring researchers to collect dietary assessment data in the field versus in well-controlled clinical settings, there is a heavy reliance on the accuracy of self-report dietary assessment measures, such as food frequency questionnaires (FFQs); however, FFQs are not without limitations. FFQs are vulnerable to intra-individual variation, and misreporting of dietary intake has been associated with certain personal characteristics. As an example, overweight and obese

Abbreviations: DGA, Dietary Guidelines for Americans; ENR, energy normal reporters; EOR, energy over reporters; EUR, energy under reporters; FFQ, Food Frequency Questionnaires; LMD, Lower Mississippi Delta; pTEE, predicted total energy expenditure; rEI, reported energy intake.

* Corresponding author. Fax: +1 601 266 6343.
E-mail addresses: jennifer.lemacks@usm.edu (J.L. Lemacks), holly.huye@usm.edu (H. Huye), renee.rupp@gmail.com (R. Rupp), carol.connell@usm.edu (C. Connell).

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individuals have been shown to underreport energy intake (Samuel-Hodge et al., 2004), and compared to women, men are less likely to under-estimate energy intake (Braam et al., 1998).

Interviewer-administration of FFQs, versus self-administration, may improve dietary intake reporting accuracy (Block et al., 2006), but what remains elusive is how an interviewer's race may influence the participant's energy intake reporting, as assessed by FFQs. A research participant's feelings of cultural mistrust or perceptions of racial barriers or stereotyping may influence dietary assessment results as well, which may in turn misrepresent relationships between diet and health outcomes. Thus, the purpose of this study was to determine whether interviewer–respondent race match influenced FFQ energy reporting accuracy in a Deep South (the Lower Mississippi Delta [LMD] Region of the US), largely African American, study population. High obesity rates (Zhang et al., 2011), partially attributed to poor dietary quality (Thomson et al., 2011), plague both African American and White Delta residents. This region has been the target of health intervention research (Tussing-Humphreys et al., 2013) and therefore, was an ideal location within which to investigate influences of interviewer race on dietary data quality. The specific objectives were to classify energy misreporters, identify relationships between misreporting and confounding variables, and establish whether interviewer–respondent race match impacts FFQ reporting accuracy among a LMD population.

Methods

Study design and participants

An observational study of a cohort participating in a USDA-funded project by the Delta Obesity Prevention Research Unit in the LMD was conducted. The overall goals of the project were: (1) to adapt the Dietary Guidelines for Americans (DGA) eating patterns for the LMD population and (2) to conduct intervention studies testing the effectiveness of the adapted DGA eating patterns in reducing weight gain and risk factors for obesity-related chronic disease in the LMD population. Data from a FFQ were used to identify intake deficiencies or excesses based on food groupings which guided the targets of a nutrition education intervention to improve adherence to the DGA.

Women living in 11 LMD counties in Mississippi were the primary target of this project; however, men were not excluded. Our previous research in the region indicated that women were “gatekeepers” of food and nutrition in the Delta (McGee et al., 2008; Huye et al., 2013). Second, the theoretical underpinning of the intervention was Rogers' diffusion of innovations theory, thus we chose to target women who were likely to be “early adopters” of new ideas, which in this case were dietary behaviors (manuscript in review). Early adopters as described by Rogers are often well educated with higher socioeconomic status than late adopters (Rogers, 1995). Early adopters can be influential in spreading new ideas to late adopters because they are often seen as leaders in their communities. In the Delta, well-educated, higher socioeconomic status women are leaders in civic, social and religious organizations that often have community improvement as organizational goals (Huye et al., 2013). Thus, we purposively located these organizations and recruited members to participate in an effort to eventually “diffuse” the adapted DGAs to the broader population in the region.

Participants for this secondary analysis were selected from 319 participants who completed a baseline assessment during May–June 2011 for participation in the Mississippi Communities for Healthy Living intervention. Recruitment of participants was carried out through a variety of means, including contacts with civic and social clubs identified through Chamber of Commerce listings and the internet and personal contacts with churches. Among those completing the baseline assessment, 286 (89.7%) were women. Inclusion criteria included participants with complete data and African Americans, considering the small number of Caucasians in the original sample ($n = 14$).

Food frequency questionnaire protocol

Dietary intake data were collected during the baseline assessment using an FFQ designed specifically to capture dietary intake, over the past three months, of African American and White residents of the LMD (Tucker et al., 2005). The instrument included region-specific foods and was thus designed to reduce energy underreporting that may have been a result of commonly eaten foods not being captured. Trained data collectors administered FFQs with each participant, lasting approximately 30 min, and used food model kits to assist with determination of portion sizes. Data used in this analysis were collected at enrollment, with minimal contamination of nutrition education or other intervention efforts.

All data collection protocols of the original project were approved by The University of Southern Mississippi Institutional Review Board (IRB). The protocol directly related to this observational study was exempt from IRB approval.

Energy intake and reporting assessment

Reported energy intake (rEI, kcal/day) was obtained from FFQs. The scannable FFQs were analyzed by the dietary assessment center at Northeastern University (Boston, MA), and dietary data were generated for each participant at each time point. Predicted total energy expenditure (pTEE, converted to kcal/day), based on age (in years), weight (in kilograms), height (in centimeters), and sex (is 0 for men and 1 for women), was estimated for each participant using the Vinken et al. (1999) equation, developed for use in any field setting. Measures used in this equation are practical for community-engaged research, and the equation was shown to compare favorably with doubly-labeled water measurements in 93 adult men and women (Vinken et al., 1999). The equation is as follows:

$$\text{pTEE} = 7.377 - (90.07 \times \text{age}) + (0.0806 \times \text{weight}) + (0.0135 \times \text{height}) - (1.363 \times \text{sex}).$$

Cut-off values, developed by the Energy Metabolism Laboratory at the Jean Mayer USDA Human Nutrition Research Center (McCrory et al., 2002) and based on the Vinken et al. (1999) equation, were utilized to classify energy under-(EUR), over-(EOR), and accurate or normal (ENR) reporters with rEI <70% or >130% of pTEE (±1 standard deviation), respectively. These values are considered useful for examining relationships between habitual dietary intake and health outcomes (McCrory et al., 2002), as would be our purpose for future analyses.

Other variables

The primary independent variable was “race match”, a dichotomous variable indicating whether or not interviewer-reported race matched (was the same as) that of the interviewee (study participant). Several other potential predictors of energy intake misreporting were selected based on previously reported relationships in various populations, including educational level (Abbot et al., 2008; Braam et al., 1998), perception of health status (Abbot et al., 2008), body mass index (BMI) (Samuel-Hodge et al., 2004), gender (Braam et al., 1998), and age (Braam et al., 1998). Body mass index was calculated as weight (kg) divided by height $(m)^2$, measured to the nearest 0.1 kg with a Tanita 310 model digital scale and to the nearest cm with a portable stadiometer, respectively. Other variables were derived from enrollment survey data (Table 1).

Statistical analyses

Initially, chi-square and correlation analyses were conducted to identify relationships of the categorical variables EUR and EOR with educational level, perception of health status, BMI, gender, and age (described in Table 1). Variables with an identified significant