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Relative validity of a tool to measure food acculturation in children of Mexican descent

Luz Elvia Vera-Becerra [a], Martha L. Lopez [b], Lucia L. Kaiser [c, *]

[a] Department of Medicine and Nutrition, University of Guanajuato, Blvd. Puente del Milenio #1001 Fracción del Predio de San Carlos, León, 37670, Guanajuato, México
[b] Emeritus-University of California, Lopez Consulting, 1595 Kathryn Lane, Bellingham, 98229, WA, USA
[c] Department of Nutrition, University of California, Davis, One Shields Avenue, Davis, 95616, CA, USA

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ABSTRACT

The purpose of this study was to examine relative validity of a food frequency questionnaire (FFQ) to measure food acculturation in young Mexican-origin children. In 2006, Spanish-speaking staff interviewed mothers in a community-based sample of households from Ventura, California (US) (n = 95) and Guanajuato, Mexico (MX) (n = 200). Data included two 24-h dietary recalls (24-DR); a 30-item FFQ; and anthropometry of the children. To measure construct, convergent, and discriminant validity, data analyses included factor analysis, Spearman correlations, t-test, respectively. Factor analysis revealed two constructs: 1) a US food pattern including hamburgers, pizza, hot dogs, fried chicken, juice, cereal, pastries, lower fat milk, quesadillas, and American cheese and 2) a MX food pattern including tortillas, fried beans, rice/noodles, whole milk, and *pan dulce* (sweet bread). Out of 22 food items that could be compared across the FFQ and mean 24-DRs, 17 were significantly, though weakly, correlated (highest r = 0.62, for whole milk). The mean US food pattern score was significantly higher, and the MX food pattern score, lower in US children than in MX children ($p < 0.0001$). After adjusting for child's age and gender; mother's education; and household size, the US food pattern score was positively related to body mass index (BMI) z-scores (beta coefficient: +0.29, p = – 0.004), whereas the MX food pattern score was negatively related to BMI z-scores (beta coefficient: −0.28, p = 0.002). This tool may be useful to evaluate nutrition education interventions to prevent childhood obesity on both sides of the border.

1. Introduction

Defined as body mass index (BMI, kg/m^2) for age and gender ≥ 85th and 95th percentiles respectively, overweight and obesity have become serious health concerns for US children, especially in some minority populations. In 2011–12, the prevalence of overweight and obesity among Hispanic and non-Hispanic black children, ages 2–19 years, was greater (38.9% and 35.2%, respectively) than that reported for non-Hispanic white (28.5%) children (Ogden, Carroll, Kit, & Flegal, 2014). Childhood obesity has also become a serious health concern in Mexico. According to the Mexican National Survey of Nutrition, prevalence of overweight and obesity in Mexican children (5–11 years old) increased from 19.5% in 1999 (Hernández, Cuevas-Nasu, Shaman-Levy, 1999) to 26.2% in 2006 (Bonvecchio, Safdie, & Monterrubio, 2009). The 2012 estimates of overweight and obesity for Mexican children, ages 5–11 years, were even higher (girls: 32% and boys: 36.9%) (Gutiérrez, Rivera-Dommarco, & Shamah-Levy, 2012).

Effective obesity prevention strategies are urgently needed to reduce health disparities in Mexican-heritage populations (i.e. US-born Latinos of Mexican descent or Mexican-born immigrants). Overweight or obese children are more likely to develop cardiovascular risk factors in adolescence (Garnett, Baur, & Srinivasan, 2007) and early adulthood (Janssen, Katzmarzyk, & Srinivasan, 2005). Obese children also have increased odds of psychosocial problems, depression, and asthma (Halfon, Larson, & Slusser, 2013). While obesity prevention involves addressing multi-levels of influence, the family and child care environments have been a focus in interventions targeting preschoolers (Hoerr, Hughes, & Fisher, 2009; Tovar, Hennessym, & Pirie, 2012; Hughes, Power, & Orlet Fisher, 2005; Kaiser, Melgar-Quiñonez, & Lamp, 2001; Slusser,

* Corresponding author.
E-mail addresses: lvera@ugto.mx, vebe69@hotmail.com (L.E. Vera-Becerra), mllopez@ucdavis.edu (M.L. Lopez), llkaiser@ucdavis.edu (L.L. Kaiser).

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Frankel, & Robison, 2012; Barkin, Gesell, & Po'e, 2012). Although Mexican-heritage preschoolers consume higher quality diets than other ethnic groups, diet quality declines in these children as they grow older (Kranz, Findeis, & Shrestha, 2008; Lorson, Melgar-Quiñonez, & Taylor, 2009). Thus, early prevention in Mexican-heritage populations should stress to parents and child care providers the ways to maintain healthier food patterns as young children transition to school.

To evaluate the effectiveness of community-based nutrition interventions, there is a need for valid, culturally-relevant tools to measure food patterns of Mexican-heritage children. Especially where audiences may be difficult-to-reach (care givers have very low income and/or education levels), tools need to be simple to administer. Placing attention on eating or food patterns, rather than nutrient intake, enables the evaluation to have a closer tie-in to nutrition messages communicated in a community-based nutrition education intervention. Several measures of relative validity can be useful to apply in developing tools. Construct validity examines the extent to which an instrument measures the theoretical concepts (or constructs) that the researcher wishes to study (for example, a cultural food pattern) (Kidder, 1981). Convergent validity examines the agreement or positive correlation between two instruments that measure the same construct, where neither instrument can be considered a "gold standard"(for example, dietary recalls and food frequency questionnaires). Alternatively, discriminant validity can be assessed by measuring negative associations between variables. For example, a higher level of acculturation to the US dominant culture might be negatively related to the consumption of traditional Mexican foods.

Binational studies can be useful to get a dynamic picture of changes that occur in eating behaviors among immigrant families (Rosas, Harley, & Fernald, 2009; Vera-Becerra, Lopez, & Kaiser, 2015). This approach involves a comparison of similar cohorts in Mexico and US, using evaluations tools that work well on both sides of the border. A previous study that compared diets in Mexican and Mexican-American populations reported a positive relationship between food insecurity and greater consumption of total fat, saturated fat, sweets, and fried snacks but only in the US sample (Rosas et al., 2009). In 2006, we conducted a binational study among Mexican immigrant families in Ventura California (US) and their Mexican (MX) counterparts in rural Guanajuato Mexico. Prevalence of childhood overweight and obesity was much higher in the US (49.5%) than in the MX (24.4%) children, ages one to six years(Vera-Becerra et al., 2015).

Using dietary data from that sample, the purpose of this study was to examine the convergent, construct, and discriminant validity of a food frequency questionnaire (FFQ) tool to measure food acculturation in young Mexican-heritage children. Specific research questions included: 1) Is the FFQ tool able to detect differences in food intake in a sample from the US and Mexico?; 2) How well does food intake, determined by the FFQ compare to that derived from 24-h dietary recalls?; and 3) Is the FFQ able to reveal food patterns that are correlated with preschooler BMI z-scores?

2. Materials and methods

The study involved a cross-sectional design, with interviews conducted in Ventura County, California (US) and the municipality of Cueramaro, Guanajuato (MX) from April to December, 2006. The methodology for the study and description of the sites is available elsewhere(Vera-Becerra et al., 2015). The protocol was reviewed and approved by the Institutional Review Board at the University of California in Davis and the Committee of Bioethics at the University of Guanajuato in Leon. Parents provided informed consent and signed approved consent forms.

Participants The study included an urban area in Ventura, California; the town of Cueramaro (a semi-rural area); and the village of San Gregorio (a rural area). Eligibility criteria included: 1) mother or father was born in Guanajuato or Jalisco; 2) family had at least one child ages 1–6 years old; and 3) child had been under the care of the mother (or other primary caregiver being interviewed) since birth. For families in MX, an additional requirement was that the family head (or adult in the same household) had been working/living in the US. For California families, the mother had to self-identify as Mexican or Mexican-heritage. Excluded in US and MX were any children who suffered from a serious disease (like cancer) that affects food intake and/or nutritional status. The sample size was based on an expected difference of 2.0 in mean BMI of preschoolers across US and MX) with a level of significance of 0.05 and power of 0.90. The total calculation was 102 families in each of the three sites.

Data collection In both countries, a convenience sampling method was used.Recruitment strategies included contact with different agencies and schools, distribution of flyers, presentations at parent meetings, referrals of relatives or neighbors, and door-to-solicitation. All subjects on both sides of the border were interviewed in Spanish, which was their preferred language. In Mexico, trained undergraduate nutrition students interviewed parents and measured children in the home or at a clinic site. In the US, trained Cooperative Extension nutrition educators collected the data mostly in the homes. At initial visits, food frequency questionnaires, one diet recall, and anthropometric measures were collected. A second home visit (or phone call in the US) was made to collect the second diet recall. If more than one eligible child was in the family, only one target child older than 24 months was chosen, using a simple coin toss, to examine child dietary intakes from recalls and questionnaires.

Food frequency questionnaire (*FFQ*) Nutrition professionals (two from the US and one from MX) with expertise in Mexican food habits identified 30 food items representing the popular American diet (for example, hamburgers, pizza, fries.) and the typical Mexican diet (corn tortilla, beans, rice). The first author (LVB) conducted open-ended interviews with ten Spanish-speaking Mexican immigrant women to check for understanding of the food items and response options. Each item included four options to describe the frequency of intake: 0 = never; 1 = a few times a month (but less than weekly); 2 = several times a week; or 3 = daily. Similar to the rest of the survey, the interviewers read the questions to the mother, emphasizing that the FFQ pertains to intakes of the target child during the past month.

Diet recall method The 24-h dietary recall (24-DR) was conducted using the multiple-pass method (Blanton, Moshfegh, & Baer, 2006; Burrows, Martin, & Collins, 2010). To standardize procedures, staff (four in MX and two in US) attended two-day training in each country to learn the protocol and procedures in the administration of the recalls and other survey instruments. Portion sizes during the recalls were estimated using standardized utensils including a teaspoon, tablespoon, cup, and soup bowl. Plastic models for common-consumed items (corn tortilla, portion of meat, portion of rice, and portion of beans) were also used. The two 24-DR were recorded on two random week days, with at least one week between the first and the second recall. Nutrition Data System for Research 2009 (NDRS) at the University of Minnesota, Minneapolis MN, was used to assess nutrient and food groups intake from the 24-DR. The first author coded and entered all of the dietary data into the dietary software program.

Anthropometry The researchers weighed and measured all children, ages one to six years, living in the households at the time of the study. Portable Seca scales and stadiometers were used in the study (Perspective Enterprises, Kalamazoo MI). In the training, staff