Published in final edited form as:

Appetite. 2016 December 1; 107: 558–567. doi:10.1016/j.appet.2016.09.012.

African-American and Hispanic Children's Beverage Intake: Differences in Associations with Desire to Drink, Fathers' Feeding Practices, and Weight Concerns

Karina R. Lora^{1,†}, Laura Hubbs-Tait², Ann M. Ferris³, and Dorothy Wakefield³

¹Department of Nutritional Sciences, University of Oklahoma Health Sciences Center, PO Box 26901, Oklahoma City, OK 73126-0901

²Department of Human Development and Family Science, Oklahoma State University, 341 Human Sciences, Stillwater, OK 74078

³Center for Public Health and Health Policy, UConn Health, 263 Farmington Avenue, MC 6030, Farmington, CT 06030-6030

Abstract

Relationships of African-American and Hispanic fathers' feeding practices and weight concerns and preschoolers' desire to drink with children's beverage intake were examined, and associations between fathers' feeding practices and children's weight status were evaluated. Fathers' (Hispanic $n = 61$, African-American $n = 49$) difficulty in child feeding, use of food to calm, use of food as reward, and concern about the child being under and overweight as well as their child's desire to drink were assessed. Preschoolers' (ages 2 to 5) total sugar-sweetened beverage (SSB), fruit juice, and water intake were measured by a modified beverage intake questionnaire. Body Mass Index (BMI) and BMI percentile were calculated for fathers and children, respectively. Multiple regressions revealed that, in Hispanics, difficulty in feeding, concern about underweight, use of food to calm, and use of food as a reward were significantly associated with child intake of total SSB, whereas, in African-Americans, child desire to drink was associated with total SSB and fruit juice. Concern about the child being underweight was inversely associated with child BMI percentile in Hispanics. Significant differences in regression coefficients of child SSB intake to fathers' behaviors versus child desire to drink between the two racial-ethnic groups indicated that use of food to calm the child predicted increased intake of SSB by Hispanic but not by African-American children, while child desire to drink predicted increased intake of SSB by African-American but not by Hispanic children. Because of these significant differences, future research might profitably explore socio-cultural influences on associations of additional child feeding

[†]Corresponding author Email addresses: K.L.: karina-lora@ouhsc.edu, L.H-T.: laura.hubbs@okstate.edu, A.F.: aferris@uchc.edu, D.W.: dwakefield@uchc.edu.

¹Present address: Center for Public Health and Health Policy, UConn Health, 263 Farmington Avenue, MC 6030, Farmington, CT 06030-6030. lora@uchc.edu

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

behaviors with fathers' attempts to control them. Furthermore, practitioners should consider developing and evaluating different child obesity interventions for these two racial-ethnic groups.

Keywords

Fathers; African-American; Hispanic; feeding practices; sugar-sweetened beverages

Introduction

Socioeconomic and racial/ethnic disparities in the prevalence of obesity in the U.S. are well documented (Braveman, 2008; Singh, Siahpush, & Kogan, 2010; Weedn, Hale, Thompson, & Darden, 2014). In the 2- to 5-year-old age group, non-Hispanic African-American and Hispanic children are more likely than children from any other race/ethnic groups to be obese, 10.4% and 15.6%, respectively (Ogden et al., 2016). Nonetheless, low-income minority children are the most affected. Among two-to-four year-old low-income children participating in a federal food assistance program, 36% of Hispanic children were overweight or obese (Weedn, Ang, Zeman, & Darden, 2012), and Hispanic children had the highest obesity prevalence (18.4%) in the most recent follow up (Weedn et al., 2014). Similarly, whereas approximately 33% of 15,902 2- to 11-year-old children in California were overweight or obese, 40% of African-American children and 40% of Latino children of English-speaking parents were overweight or obese. These children were also more likely to be from low-income families as higher proportions of minority children in the study were living below the federal poverty threshold (Guerrero & Chung, 2016). Such disparities in socio-economic and racial/ethnic indicators of child obesity highlight the need to study the most vulnerable groups to identify intervention targets.

The development of childhood overweight and obesity involves multiple factors at multiple levels, including the family, school, community, and society (Davison & Birch, 2001; Harrison et al., 2011). At the family level, parental feeding practices influence children's development of dietary behaviors, intake, and weight (Birch, 2006; Birch & Davison, 2001). However, the majority of research on parental feeding practices and concerns has focused on mothers (Baugcum et al., 2001; Birch et al., 2001; Saelens, Ernst, & Epstein, 2000; Webber, Cooke, Hill, & Wardle, 2010b). Fathers' child feeding practices have occasionally been investigated (Khandpur, Blaine, Fisher, & Davison, 2014). A recent review of this literature indicated that fathers compared to mothers were more likely to pressure the child to eat, use restriction for children with higher Body Mass Index (BMI), and report controlling feeding practices when the child was a slow eater, and less likely to monitor the child's food intake and limit access to food (Khandpur et al., 2014). Furthermore, another review suggested that fathers' modeling food behaviors, feeding practices, weight, and parental skills influenced child eating and weight, independent of maternal behaviors (Fraser, 2011). This suggestion that fathers' feeding behaviors are an important influence on the development of child eating patterns and weight status underscores the need to identify paternal feeding practices that are associated with the child's intake of unhealthy foods or beverages. In addition to the research comparing mothers and fathers that suggests independent influences of their behaviors on children's eating and/or weight, recent studies

have taken a fathers-only approach that provides more detail about fathers' influence. For example, paternal restriction was recently identified as a significant moderator of two relationships: between child satiety responsiveness and child BMI z-scores and between child emotional overeating and child BMI z-scores (Vollmer, Adamsons, Foster, & Mobley, 2015). In addition, fathers with higher concern about their child becoming overweight had higher perceived responsibility for child feeding and were more controlling about the type and amount of food the child eats (Mallan et al., 2014). In a study of Latino fathers, fathers' controlling behaviors were associated with fruit and vegetable consumption but not with sugar-sweetened beverage (SSB) or fast food consumption (Parada, Ayala, Horton, Ibarra, & Arredondo, 2016). These findings for Latino fathers and their 7- to 13-year-old children contrast sharply with the findings of a study of the association of mothers' feeding practices and SSB consumption by 6-year-old children from the largely White Infant Feeding Practices Study II (Park, Li, & Birch, 2015). The discrepancy in age and race/ethnicity/culture between studies may account for the inconsistency but additional research is clearly needed to resolve whether Latino fathers' practices are related to their children's SSB consumption.

Intake of SSB and, controversially, fruit juice has been associated with childhood obesity (Malik, Pan, Willett, & Hu, 2013; US Department of Agriculture, 2010). The high intake of SSB and fruit juice among low-income children is particularly worrisome. A national sample of 2-to-4-year-old children participating in the Supplemental Nutrition Assistance Program for Women, Infants and Children (WIC) consumed 54.0 ± 4.2 kcal/d from fruit drinks and 24.5 ± 2.8 kcal/d from soda. Fruit juice consumption was 95.8 ± 6.6 kcal/d (Watowicz & Taylor, 2014). Hispanic 2-5 year-old children had higher odds of consuming any SSB than African-American or White children in California (Beck, Patel, & Madsen, 2013). Furthermore, greater consumption of SSB by African-American and Hispanic than White 2 year-olds has been identified as one of the early childhood risk factors that contributes to the greater BMI z-scores of Hispanic and African-American 7-year-olds compared to their White peers (Taveras, Gillman, Kleinman, Rich-Edwards, & Rifas-Shiman, 2013).

Understanding the complex feeding interactions between parents and children requires acknowledging that the family's cultural background plays an important role in parent-child feeding behaviors (Harrison et al., 2011). For instance, studies that examined parental feeding behaviors in low-income African-American and Hispanic parents of preschoolers reported more parent-centered/high control and child-centered feeding strategies among Hispanic parents than African-American parents (Hughes et al., 2006). Hispanic parents were more likely to have an indulgent feeding style, while African-American parents were more likely to have an uninvolved feeding style (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). African-American and Spanish-speaking Hispanics parents were more likely to use food to calm the child than were English-speaking Hispanics (Evans et al., 2011). Additional studies examining cultural differences between African-American and Hispanic parents' feeding practices should consider examining these in fathers to determine whether previous differences can be replicated. Furthermore, the links of such cultural differences in practices to children's intake and weight status have not yet been investigated and such

investigations are needed in order to tailor interventions to cultural groups so as to enhance intervention success.

With the exception of three studies that report associations of fathers feeding practices with child's food or beverage intake or weight status in African-American (Harris & Ramsey, 2015) and Mexican (Tschann et al., 2013; Tschann et al., 2015) dyads, most literature examining fathers' feeding practices and child health outcomes used predominantly White samples (E. Haycraft & Blissett, 2008a; E. Haycraft & Blissett, 2008b, 2012; Mallan et al., 2014; Vollmer, Adamsons, Foster, et al., 2015). A study of African-American father figures of 3-to-13 year old children revealed that paternal intake of fruits, vegetables, and SSB predicted children's consumption of these foods and beverages (Harris & Ramsey, 2015). In a sample of Mexican parents of 8-to-10-year-old children, mothers' and fathers' positive involvement in child eating, pressure to eat, and restriction were significantly associated with child BMI; however, use of food to control behavior was negatively associated with child BMI only when reported by fathers (Tschann et al., 2013). In a two-year longitudinal study that assessed parental feeding practices in Mexican parents of 8-10 year-old children, restriction of food by both parents predicted higher child weight from baseline to 12 months later; however, at 24 months into the study, only fathers' food restriction predicted high child weight (Tschann et al., 2015). Thus, fathers' influence may promote child healthy eating (e.g., in modeling) or increase unhealthy eating (e.g., in restriction) and the unhealthy influence may be particularly problematic for children's intake of high caloric foods or beverages.

Eating behaviors in children can be grouped as traits indicative of greater appetite or approach towards eating (food approach) and traits reflecting poor appetite or avoidance of eating (food avoidance) (Carnell & Wardle, 2007; Webber, Cooke, Hill, & Wardle, 2010a). Food avoidance traits include satiety responsiveness, slowness in eating, fussiness, and emotional undereating (Carnell & Wardle, 2007; Webber et al., 2010a). Food approach traits include food responsiveness, desire to drink, enjoyment of food, and emotional overeating and have been associated with child risk for high weight status due to child responsiveness to external food cues (Parkinson, Drewett, Le Couteur, Adamson, & Gateshead Millennium Study Core, 2010; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009), although other studies have reported these associations to be affected by parental BMI (Fuemmeler, Lovelady, Zucker, & Ostbye, 2013). In the only study to date of minority children that included desire to drink, no significant associations between child BMI and food responsiveness or child desire to drink have been reported in low-income African-American preschoolers (Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006). The dearth of such studies underscores the need for investigations such as the current one.

Assessing family factors that may influence the development of young children's unhealthy food and beverage intake is important for childhood obesity prevention. Examining feeding behaviors of African-American and Hispanic fathers is imperative to elucidate associations between fathers' behaviors and child SSB consumption that could explain the disparities in SSB consumption and child weight identified by Taveras et al. (2013). More generally, examining feeding behaviors of African-American and Hispanic fathers is needed to fill the knowledge gap about cultural differences in how minority fathers feed their children. In

addition to testing differences in feeding practices of African-American and Hispanic fathers, exploratory analyses were conducted to examine relationships among African-American and Hispanic fathers' feeding practices and preschoolers' (1) desire to drink, and (2) intake of beverages. Furthermore, the relationship between paternal feeding practices and children's weight status was assessed. Differences in associations of child SSB intake to fathers' behaviors and child desire to drink between the two racial-ethnic groups are explored to suggest important targets for future interventions into young children's beverage consumption.

Materials and methods

Study sample and recruitment

A convenience sample of African-American ($n = 49$) and Hispanic ($n = 61$) fathers and their children participated. To determine the study sample size, an effect size was calculated based on the difference between the means for the factor, concern about the child being overweight, from the Preschooler Feeding Questionnaire (PFQ) reported by low-income African-American and Hispanic fathers of preschool children in a preliminary study (Ferris, Wakefield, Lora, & Quesada, 2014). With power of 80%, PASS11 software calculated a sample size of 49 for each group would be needed (PASS vs 11 Kaysville, UT, www.ncss.com). Fathers' inclusion criteria were: 1) biological father of a 2-to-5-year-old child, responsible for feeding the participating child (father fed the child at least five times a week), sharing at least one weekly family dinner with the child; and 2) participating child without special dietary needs or developmental disabilities. Recruitment of fathers was direct and took place in the following steps. First, zip codes with predominantly low-income minority residents were identified.

Second, community stakeholders with long-standing partnerships with the university were approached to seek their assistance in recruiting the fathers. Recruitment sites were preschool centers, churches, and community health clinics, all located in the previously identified low-income zip codes in Oklahoma City, OK because the target population was low-income fathers. Third, researchers approached males as they were picking up children from a preschool center, entering or exiting church services or community health clinics. Those fathers interested in the study that met inclusion criteria and had the target child with them during recruitment were enrolled in the project. One-hundred and thirty nine males were approached; 110 agreed to be part of the study. There were no withdrawals after a participant consented to be part of the research. The University of Oklahoma Health Sciences Center Institutional Review Board approved the protocol.

Data collection and measures

Fathers provided written informed consent before researchers conducted one-on-one interviews in the language of preference (English or Spanish). Two native Spanish-language speakers (M.F. and K.L.) were available to conduct interviews in Spanish. The procedure for translating survey questions from English to Spanish followed Marin's double translation methodology (Marin, 1991). To serve as a proxy for acculturation of Hispanic fathers, interviewers asked all Hispanic fathers two questions, 1) Do you prefer to speak in English

or Spanish? and 2) Do you prefer we conduct the interview in English or Spanish? All Hispanic fathers' responded "Spanish" to each of the two questions. Thus, all interviews were conducted in Spanish and acculturation was judged to be equivalent across all Hispanic fathers. Researchers read questions aloud and marked responses on a printed survey. This strategy was intended to minimize incomplete data and to avoid potential low literacy issues that could affect responses. Interviews lasted 45 minutes on average. If a father reported that more than one child met inclusion criteria, he was asked to report for only one child. Fathers received a \$20 gift card. Demographic information and key study variables were collected as described below.

Paternal feeding practices and concerns

Information about feeding practices and concerns was collected using the PFQ (Baughcum et al., 2001) and the Comprehensive Feeding Practices Questionnaire (CFPQ; (D. Musher-Eizenman & Holub, 2007). Both instruments included fathers in their development and were previously utilized to assess feeding practices in a diverse sample of parents (Evans et al., 2011). The PFQ is a 32-item questionnaire that explores feeding practices, attitudes (e.g., concern about a child's overweight and underweight status), and perceptions (e.g., of child feeding difficulty). Baughcum et al. (2001) identified eight factors: 1) difficulty in child feeding, 2) concern about the child overeating or being overweight, 3) pushing the child to eat more, 4) using food to calm the child, 5) concern about the child being underweight, 6) child's control of feeding interactions, 7) structure during feeding interactions, and 8) age-inappropriate feeding. Responses are arranged in a 1- to 5-point Likert-type scale with word anchors. Responses to feeding practices items are anchored from never to always (factors 1, 3, 4, 6, 7 and 8); responses to feeding beliefs are anchored from disagree a lot to disagree a little (factors 2 and 5). Prior to the current study, a factor analysis of the PFQ was conducted in an independent sample of low-income multiethnic parents of 3-to-5-year-old children ($n = 662$) and tested measurement invariance between African-American ($n = 181$) and Hispanic ($n = 158$) parents. The final factor structure included: 1) difficulty in child feeding (4 items, $\alpha = 0.84$), 2) concern about the child overeating and being overweight (7 items, $\alpha = 0.74$), 3) using food to calm the child (4 items, $\alpha = 0.86$), and 4) concern about the child being underweight (2 items, $\alpha = 0.78$). The final model had a significant chi-square, $\chi^2(110) = 224.91$, $p < 0.001$. Other model fit indices were acceptable (TLI = 0.922, CFI = 0.937, RMSEA = 0.056). Factorial invariance indicated that the four-factor model of the PFQ was equivalent in African-American and Hispanic parents. One factor from the CFPQ, use of food as reward (3 items, $\alpha = 0.69$), was also used in the present study (D. Musher-Eizenman & Holub, 2007). Responses to the use of the food as reward factor of the CFPQ are structured in a 1- to 5-point Likert-type scale with word anchors (disagree to agree). Cronbach's alphas for the five factors in the current sample were: difficulty in child feeding, 0.80; concern about the child overeating and being overweight, 0.71; use of food to calm the child, 0.72; concern about the child being underweight, 0.61; and use of food as reward, 0.54. In addition, fathers responded to one open-ended question about which foods or beverages they gave their preschooler "when he/she is bored or crying or upset or has temper tantrums."

Child desire to drink

The Child Eating Behavior Questionnaire (CEBQ) is a parent report measure that captures individual differences in child eating styles hypothesized to contribute to child weight status (Carnell & Wardle, 2007; Wardle, Guthrie, Sanderson, & Rapoport, 2001). The CEBQ consists of eight subscales that assess food approach or avoidance traits in children (Wardle et al., 2001). In the present study, the desire to drink factor from the food approach trait of the CEBQ was used. The construct consists of three items and has a reported $\alpha = 0.89$. Items in the factor are 1) If given the chance, my child would always be having a drink, 2) If given the chance, my child would drink continuously throughout the day, and 3) My child is always asking for a drink. Responses are arranged in a 1- to 5-point Likert-type scale with word anchors (never to always, Wardle et al., 2001). The CEBQ has been validated with parents of children 3 years and older. Cronbach's alpha for the desire to drink factor in the current sample was: $\alpha = 0.88$.

Beverage intake

The validation of the Beverage Intake Questionnaire for Preschoolers (BEVQ-PS) has been reported previously (Lora et al., 2016). Briefly, the 15-item adult beverage intake questionnaire (BEVQ-15; (Hedrick, Comber, Estabrooks, Savla, & Davy, 2010; Hedrick et al., 2012) was modified to include beverages and serving sizes consumed by 3- to 5-year-old children. Hispanic mothers ($n=109$) provided one four-day food intake record (FIR) and completed two BEVQ-PS in a 2-week period for their preschoolers through one-on-one interviews in Spanish. The modified 12-item questionnaire (BEVQ-PS) assessed preschoolers' consumption in the past month of water, fruit juice, sweetened juice drinks, whole milk, reduced-fat milk, low fat milk, flavored milk, sweetened carbonated drinks, diet carbonated drinks, sweet tea, tea with or without artificial sweetener, and sports drinks consumed. Beverage categories were grouped based on energy and macronutrient content using nutritional analysis software, and food composition tables (Pennington & Spungen, 2010). Frequency of beverage intake was determined by responses to seven options: never or less than one time per week, 1 time per week, 2-3 times per week, 4-6 times per week, 1 time per day, 2 times per day, 3 times per day or more. To assess serving size, five options were given: 1-3 fl. oz., 4-6 fl. oz., 7-8 fl. oz., 9-10 fl. oz., and 11-12 fl. oz. or more. Frequency of intake was converted to units of time per day and multiplied by serving size to provide average daily beverage consumption in fluid ounces. Criteria for validity were 1) non-significant mean differences in grams and kcal between the Time 1 BEVQ-PS (BEVQ-PS1) and the FIR for the same beverage categories, and 2) significant correlation coefficients between the same beverage categories on the BEVQ-PS1 and FIR. The criterion for test-retest reliability was a significant correlation coefficient between BEVQ-PS1 and BEVQ-PS2 beverage categories. Water, sweetened juice drinks, sweetened carbonated drinks, whole milk and total SSB met validity criteria. With the exception of flavored milk and tea with or without artificial sweeteners, all beverage categories in the BEVQ-PS were reliable ($r=0.20$ to 0.68 , $p<0.05$). In the validation of the BEVQ-PS, questionnaire administration took 3-5 minutes on average.

In the present study, administration of the BEVQ-PS with fathers took approximately 5 minutes. Different sizes of tumblers (5 oz., 8 oz. and 12 oz.) and visuals (i.e., a study-

developed beverage catalog) were used to facilitate estimation of serving sizes. Although juice did not attain the validity criteria in the study of Hispanic mothers, it was included in the current analyses because of fathers' qualitative data on juice. In particular, 49 (17 African-American and 32 Hispanic) fathers reported giving foods or beverages to calm their preschooler when bored, upset, or having a temper tantrum. Of these 49, 49% (i.e., 22% of the sample) specifically named juice when asked "would you tell me what food(s) or drink(s)?" Thus, in the current study, separate analyses were performed for the following beverages: water, fruit juice, and total SSB (consisting of sweetened juice drinks, sweetened carbonated drinks, flavored milk, sweet tea, and sports drinks).

Height and weight measures

Weight was reported to the nearest 0.01 lb. using an electronic self-calibrating digital scale (Physicians Remote Read Digital Scale 349KL, Healthometer, Bridgeview, IL). Fathers and children were measured while wearing light clothing and without shoes. Father and child heights (in inches) were measured in the standing position, looking straight ahead with the Frankfurt plane horizontal, shoulders relaxed, legs straight, and feet flat with heels together (Gibson, 2005) by positioning the participant against a non-stretchable tape fixed to a wall. All measures were taken in triplicate. Fathers' BMIs were calculated using standard formula: $(\text{wt (lb)})/[\text{ht (in)}]^2 \times 703$ (Centers for Disease Control and Prevention, 2015). Children's BMI-for-age percentile was calculated using the Centers for Disease Control and Prevention Children's BMI Tool for Schools (Centers for Disease Control and Prevention, 2014).

Statistical analysis

Data were analyzed using SAS version 9.3 (Cary, NC, USA). Descriptive (means, standard deviation, frequencies) statistics were computed for the demographic characteristics, paternal feeding practices, child desire to drink, and child intake of beverages by race and ethnicity. Chi-square analyses and *t*-tests examined differences in paternal and child characteristics by race and ethnicity. Adjusted multiple regression models controlled for federal nutrition assistance participation, education, relationship status, and child BMI percentile. Models examined associations of paternal feeding practices and child desire to drink with log-transformed child beverage intake by race/ethnicity. Log (natural logarithm) transformed child beverage intakes were computed to account for skewed distribution of the dependent variables. The resulting β coefficients were then back transformed by exponentiation of the log-transformed dependent variable. The percentage change in the dependent variable was obtained as $\exp(\beta)-1$. *T*-tests examined race/ethnic differences in regression coefficients for the association between beverages and paternal feeding practices and child desire to drink regression coefficients. Associations between paternal feeding practices and child BMI percentile were tested using Pearson correlation and partial correlation coefficients (r_{adj}) adjusting for child desire to drink. Responses to the open-ended question about which foods or beverages fathers fed their preschoolers to calm them were coded as 1 = "yes", 0 = "no" for three categories of foods/beverages: a) any food or beverage, b) sweet foods (SSB not included), and c) SSBs. Independent-sample *t* tests analyzed differences in child mean SSB log transformed intake (fl. oz.) between fathers who reported using or not using each of the three categories of foods/beverages to calm the child

within the group of African-American fathers and within the group of Hispanic fathers. Significance for all analyses was set at $p < 0.05$.

Results

Table 1 shows characteristics of the fathers and children. African-American and Hispanic fathers differed in education, relationship status, and participation in U.S. federal nutrition assistance programs. More Hispanic than African-American fathers were married/partnered, had a high school education or less, and had families who participated in WIC/Supplemental Nutrition Assistance Program (SNAP) or both. Most African-American (92%) and Hispanic (84%) fathers were overweight or obese. No statistical difference existed between groups for the categorical designation as overweight/obese.

Father's feeding practices, child desire to drink and child beverage intake

Across all measured paternal feeding practices, fathers from both groups scored highest on using food as a reward. Hispanic fathers were significantly more concerned than African-American fathers about their child overeating and being overweight and about their child being underweight. No significant differences between ethnic groups in child desire to drink were found (Table 2).

As noted in Table 2, African-American children had a significantly higher mean intake of total SSB, sweetened juice drinks and other SSB than Hispanic children. No significant differences were observed in mean intake of sweetened carbonated drinks, fruit juice or water. Because children's beverage intake data were not normally distributed, medians (fl. oz.) are included.

Associations of fathers' feeding practices, concerns, and child desire to drink with children's beverage intake

Within-group multivariate associations of paternal feeding practices and child desire to drink with child total SSB, fruit juice, and water intake in the African-American and Hispanic subsamples are in Table 3. Bivariate associations are included in Supplemental Table 1. In the multiple regressions for the African-American subsample, fathers' feeding practices were not associated with child intake of beverages, although there were significant associations in the bivariate correlations of SSB intake with use of food as a reward and fruit juice intake with use of food to calm (Supplemental Table 1). In the multiple regressions, child desire to drink was associated with the child's intake of total SSB and fruit juice in all models. A one point increase in African-American children's desire to drink was associated with an increase of 50% to 61% in the child's total SSB intake ($p < 0.001$) with differences in increase due to the difference in overlap of child desire to drink and the specific father feeding practice. A one point increase in African-American children's desire to drink was associated with a 41% to 49% increase in the child's fruit juice intake ($p < 0.001$). In the Hispanic subsample, fathers' feeding practices and concerns were associated with child's intake of total SSB. A one point increase in fathers' difficulty in child feeding and in fathers' use of food to calm the child were associated with a 33% increase ($\beta=0.33$, $p < 0.05$) and an 83% increase ($\beta=0.83$, $p < 0.001$) in child's total SSB intake, respectively. A one point

increase in father's concern about the child being underweight and in father's use of food as reward were associated with a 27% increase ($\beta=0.27$, $p < 0.01$) and with a 44% increase ($\beta=0.44$, $p < 0.001$) in child total SSB intake, respectively. No significant associations were found for child desire to drink and child intake of beverages in the Hispanic subsample in the multiple regressions in Table 3 or in the bivariate correlations in Supplemental Table 1.

Tests for significant differences in regression coefficients indicated that the association of use of food to calm the child with child SSB intake was significantly different between the two groups ($p = 0.002$). In other words, the 83% increase in total SSB intake for Hispanic children compared to the 15% decrease in total SSB intake African-American children for each one point increase in their respective fathers' use of food to calm the child is a difference of such magnitude that it is unlikely to be due to chance. No other significant differences between regression coefficients were found for total SSB, fruit juice or water. The regression coefficient for the association of child desire to drink with total SSB intake was significantly different between African-American and Hispanic children ($p = 0.001$). For each one point increase in child desire to drink, African-American children had an increase in total SSB intake in the range of 50% to 61%, while Hispanic children had a decrease in total SSB intake in the range of 6% to 15%. For the open-ended question, SSB intake (fl. oz.) was higher in children of Hispanic fathers who responded that they used sweet foods to calm their preschoolers' behavior compared to those who did not (12.02 ± 1.94 vs. 4.85 ± 2.39 , $p = 0.0003$). No other significant differences were observed in the analyses of the coded qualitative responses.

Fathers' feeding practices, concerns and child BMI percentile

Bivariate and partial correlations (due to covariation of practices and child desire to drink) between fathers' feeding practices, concern about the child weight, and child desire to drink with child BMI percentiles are shown in Table 4. No significant associations were observed in the African-American subsample. In the Hispanic subsample concern about the child being underweight was negatively correlated with child BMI percentile (Table 4).

Discussion

To our knowledge this is the first study to report cultural differences in the association of paternal feeding practices with preschoolers' intake of high calorie beverages in two minority groups of fathers and children. Multiple regression models revealed use of food to calm, use of food as a reward, concern about underweight, and difficulty in feeding the child were positively associated with child intake of SSB in the Hispanic but not in the African-American subsample. In contrast, the child's desire to drink was associated with child intake of SSB and fruit juice in the African-American but not in the Hispanic subsample. Additionally, tests of differences in regression coefficients indicated that significantly different relations existed between the two minority groups. In the Hispanic but not in the African-American subsample, the father's use of food to calm the child predicted increased child intake of SSB, while in the African-American but not in the Hispanic sample, child desire to drink predicted increased child intake of SSB. It is important to note that the bivariate analyses (Supplemental Table 1) show African-American fathers' practices were

associated with child SSB and fruit juice intake. The multiple regression analyses in Table 3 make clear that these associations are overridden by the association of child desire to drink with both SSB and fruit juice intake in the African-American sample. Because child desire to drink is related to fathers' feeding practices in the bivariate correlations for both samples and because SSB intake is related to African-American children's desire to drink and to Hispanic fathers' feeding practices, longitudinal research on the development of these relations is needed to determine whether child desire to drink or fathers' practices or both constitute critical targets in the formulation of interventions to reduce child SSB intake.

Within-group associations of fathers' feeding practices and children's intake of SSB provide clues about obesogenic practices in the Hispanic subsample. First, father's use of food as reward (instrumental feeding) and to calm the child (emotional feeding) was associated with an increase in the child's intake of SSB. Uses of food to control behavior and temperament have been proposed to reduce the child's ability to internally regulate his or her own feelings of hunger and satiety (Carper, Orlet Fisher, & Birch, 2000). Usually, palatable and high energy foods are offered in the context of these practices (Saxton, Carnell, van Jaarsveld, & Wardle, 2009). Among young children up to 12 months in age, sweetened drinks were more likely to be offered as a reward or as a treat for good behavior (Hoare et al., 2014). Similarly, sweets (i.e., candy, ice cream), nuts, and savory snacks were more frequently offered as rewards to children aged 4-12 years (Raaijmakers, Gevers, Teuscher, Kremers, & van Assema, 2014). Although a number of studies have described parents' use of unhealthy foods or beverages in the context of instrumental and emotional feeding, associations have been predominantly reported by mothers. In the current study, Hispanic fathers' qualitative data strengthens the evidence for the association of the use food or drink to calm the child with Hispanic children's SSB intake. Not only was the association of the PFQ food to calm factor and child SSB intake significant, so were fathers' qualitative responses that named sweets they used in response to children's boredom, crying, or temper tantrums. Thus, calming children with both food and drink by Hispanic fathers in the current study is associated with increases in their children's ingestion of SSB. Second, a direct association was observed between Hispanic fathers' concern about the child being underweight and their child's intake of total SSB. In addition, Hispanic fathers scored significantly higher than African-American fathers in concern about the child being underweight although 63% of Hispanic children were considered normal weight. Others have reported parallel results in similar cultural groups. Spanish-speaking Hispanic parents compared to English-speaking Hispanic parents in the U.S. were more likely to be concerned about the child being underweight (Evans et al., 2011). Like the Spanish-speaking sample in the study by Evans et al. (2011), Hispanic fathers in the current study all preferred to speak Spanish. Thus, Hispanic fathers' perception and concern about the child's low weight may have influenced fathers to use high caloric foods or beverages as a strategy to influence their child's weight gain.

Ethnic and racial differences in caregivers' feeding behaviors (Hughes et al., 2005) and food practices (Skala et al., 2012) have been reported. When examining differences in father's feeding practices between groups, a significant regression coefficient existed for the relation between father's use of food to calm and child's intake of SSB in the Hispanic group but not in the African-American group. These results are consistent with those reported by Evans et

al., (2011) and in a pilot study with low-income mothers of preschoolers in which use of food to calm the child was positively associated with child SSB intake among Hispanic, but not African-American, children (Lora, Wakefield, & Ferris, 2014). The different relation in use of food to calm between Hispanic and African-American fathers found here also reflects the importance of child desire to drink in the African-American sample and is important for future studies to understand the potential role of culture in fathers' feeding practices and their relationship with child health outcomes. Findings on fathers' feeding practices and child's intake of high caloric foods or beverages and diet quality are just emerging (Harris & Ramsey, 2015; Vollmer, Adamsons, Gorin, Foster, & Mobley, 2015), but use of food to control behavior and children's intake have not been investigated, thus comparisons are limited. Furthermore, despite the body of research on parental feeding practices, research on findings about relationships of such behaviors to children's food or beverage consumption in minority groups in the U.S. is still infrequent, with one exception showing that while African-American fathers' intake of fruits, vegetables, and SBB predicted child intake of these foods, their modeling did not (Harris, T. S., & Ramsey, M. 2015).

Child desire to drink was consistently associated with children's intake of SSB and fruit juice in analyses of all feeding practices in the African-American subsample. Others have reported that paternal feeding practices may moderate the association between child desire to drink and child weight status (Vollmer, Adamsons, Foster, et al., 2015). As more findings are reported on the complex relations of parents' feeding behaviors, children's desire to drink, and beverage intake, future studies could explore may account for the influence of the food environment as a facilitator of food socialization practices. For instance, foods consumed by parents and made available to their children have been strongly associated with the types of foods that children eat (Wardle, Carnell, & Cooke, 2005). SSB consumption by the fathers in the current study was not measured and this may have influenced findings. In a national study, African-American/Black adults had higher odds of any total SSB consumption than Hispanic adults (Han & Powell, 2013). Paternal modeling and child desire to drink may both help explain the significantly higher SSB intake in African-American compared to Hispanic children.

Across all feeding practices, fathers' scores were highest on use of food as a reward. Parental gender differences in use of food as reward have been reported. In a sample of fathers and mothers of 5-year-old children, fathers scored higher than mothers in use of food as reward (D. R. Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, & Charles, 2009). Similarly, Taschan et al. (2013) indicated that fathers more often used food to control behavior (use of food as reward and food to control emotions) with their 8-to-10-year-old children than did mothers. Although maternal feeding practices were not assessed, results from the present study contribute to the emerging literature of paternal feeding practices by providing evidence of a type of controlling practice seldom examined in this group of parents. Whether instrumental feeding may be related to the parent's gender or other environmental factors, this practice should be further examined in male samples, as conflicting results have been reported in mothers. For instance, use of food as reward is more prevalent among mothers in low-income families (Hendy & Williams, 2012). However, others report that use of food as a reward is associated with high maternal education as was the case for increasing African-

American fathers' education and use of food as a reward in the current study (Raaijmakers et al., 2014).

Few studies have reported associations of fathers' feeding practices and concerns with children's SSB consumption and weight status and none to date on those investigated in this study, specifically, fathers' use of food to calm, food as a reward, perceptions of child eating difficulty, and concerns about overweight and underweight. Use of food to calm and food as reward are measures of use of food to control children's non-feeding behavior. Tschann et al (2013) found that fathers' use of food to control behavior was inversely correlated to child BMI. However, their measure of use of food to control behavior combined use of food as a reward and use of food to control emotions, whereas the measures in the current study separated those two different constructs. Nonetheless, the partial correlation coefficients of use of food to calm and food as a reward with child BMI percentile for both Hispanic and African-American children were negative in the current study as they were in the study by Tschann et al. (2013), albeit nonsignificant in the current study. Our finding that use of food to calm is positively and significantly correlated with SSB consumption by Hispanic children suggests that if this pattern continues as children develop, the correlation with child BMI will become positive and significant.

The current findings for young children's consumption of SSB fall between those of two other studies despite similar low-income and/or minority samples. Compared to a multicultural sample of 2-to-4-year-old children that used 12 fl. oz. as reference intake for beverage consumption, preschoolers in the present study had a lower mean intake of total SSB, sweetened juice drinks, and sweetened carbonated drinks (fl. oz.): total SSB 11.2 ± 14.5 vs. 12.0 ± 9.6 ; sweetened juice drinks 4.7 ± 5.9 vs. 9.6 ± 12 ; and sweetened carbonated drinks 2.1 ± 3.1 vs. 2.4 ± 4.8 (Davis, Koleilat, Shearrer, & Whaley, 2014). In contrast, the current study identified higher intakes than those in a validation of a food frequency questionnaire in 1-to-3-year-old low-income children with an SSB median intake of approximately 2.4 fl. oz. (0.8 serving size, 3 fl. oz. reference intake serving size) compared to the 7.1 fl. oz. median for total SSB reported for children here (Klohe et al., 2005). Differences in sweetened juice drinks and "other" beverages (flavored milk, sweet tea, sports drinks) between Hispanic and African-American children in the present study suggest SSB categories that may need to be differentially targeted in nutrition education efforts for different cultural/racial groups to reduce children's consumption. The lack of cross-study consistency and the non-existence of a reference intake for SSB consumption in the U. S. underscore the need for the current study as well as additional research efforts focused on identifying intakes. The implications of SSB daily intakes in the current study are worth emphasizing. The median and top quartile daily SSB intakes for the whole sample (7.1 and 15.0 oz.) are equivalent to approximately 97.13 and 205.20 kcal of added sugar, respectively. In the Hispanic sample median and top quartile daily intakes are equivalent to approximately 73.87 and 145.00 kcal, respectively, and in the African-American sample, they are equivalent to approximately 139.54 and 212.04 kcal of added sugar, respectively. At the time of this study, the Hispanic children were somewhat more likely to be overweight/obese than the African-American children. The ingestion pattern for African-American children in the upper quartile suggests they are particularly at risk for overweight and

obesity. Thus, they are likely to catch up quickly to the Hispanic children such that both groups will be of equivalent concern in the very near future.

Lastly, a comparison of the multiple regression table with the bivariate correlations in Supplemental Table 1 makes clear the link between African-American fathers' feeding practices and their children's intake of SSB and fruit juice. The pattern of bivariate correlations between feeding practices and children's intake of SSB and fruit juice reveals that the magnitude of correlations for SSB is higher for the Hispanic sample and the magnitude of correlations for fruit juice is higher for the African-American sample. Because child desire to drink overrode the association of both food to calm and food as reward by African-American fathers to the children's intake of SSBs and fruit juice in the multiple regressions, the importance of African-American fathers' feeding practices – particularly for fruit juice consumption – is obscured. As noted previously, longitudinal research on the development over time of fathers' practices, child desire to drink, and child beverage consumption is essential to tease apart direction of causality.

The study had limitations. Fathers' intake of beverages was not assessed. Low-income status of fathers was determined by zip codes of sites where recruitment occurred, all in low-income areas. A convenience sample of fathers participated; these fathers may have been motivated to provide information on nutrition behaviors, and thus were interested in healthy eating. Although the beverage intake questionnaire used to gather children's beverage intake was validated in a sample of low-income Hispanic mothers and their 3-5 year old children, it has not been previously utilized with fathers. Fathers may have been influenced by social desirability in reporting their children's beverage intake such that consumption of "bad" beverages (e.g. sweetened carbonated drinks) was underreported and "good" beverages (e.g. water) was over reported. Because the design was cross-sectional, causality cannot be evaluated. Father's acculturation was not assessed but the proxy measure for acculturation, preference for speaking Spanish, was equivalent across all of the Hispanic fathers in the study which suggests that acculturation was fairly uniform within that sample. Another limitation was that, although all fathers responded to an oral question that their child's race/ethnicity was the same as their own, data on maternal race/ethnicity were not collected. Thus, the possibility that some children were multiracial/ethnic cannot be ruled out. Regression analyses were exploratory and nonsignificant results may have been a function of low power; thus, replications of the current study are needed. Furthermore, each of the feeding practices was evaluated in a separate regression model which increases the possibility of Type I error. Finally, the reliability of the food as reward subscale, while acceptable, was somewhat low.

Study strengths include the use of feeding practices questionnaires that have been examined with fathers in their development or validation. Further, the PFQ was tested for cross-cultural equivalence with African-American and Hispanic caregivers of preschool children. Children's beverage consumption reflected "habitual" beverage intake, since the questions asked consumption over the period of one month. The inclusion of qualitative data on the use by fathers of sweet foods and SSB to calm their child is a strength of the current study. Finally, the current study is the first to report cultural differences in the association of

paternal feeding practices with preschoolers' intake of high calorie beverages in two minority groups of fathers and children.

Conclusions and implications

The current study provides evidence of the different relations of fathers' use of food to calm and child desire to drink as predictors of SSB intake in two race or ethnic groups. Findings from this study prompt researchers to explore the complex feeding interactions between parents, especially fathers, and children in culturally homogenous samples in which social factors seem to play an important role in the development of dietary habits. Children's SSB intake has been associated with weight gain in particular minority groups and has been identified as a factor that contributes to health disparities. The current findings extend the understanding of health disparities to include racial/ethnic differences in fathers' feeding practices that contribute to SSB intake. If the present findings are replicated, practitioners might increase the effectiveness of obesity prevention and intervention programs for Hispanic children if they involved fathers and emphasized alternatives to use food to calm children's emotions. Paternal use of food to control children's behaviors has seldom been studied in nutritional or developmental science. The findings of the current study on associations of SSB intake to fathers' feeding practices as well as child to desire to drink suggest that future research might profitably explore socio-cultural influences on associations of a wide range of children's emotions, children's feeding behaviors, and fathers' attempts to control them.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

The authors are grateful to Robert E. Larzelere, Ph.D. and Michael Anderson, Ph.D., for their statistical advice and to Marta Ferraz for her assistance with the interviews. The authors recognize child care centers, churches, and health clinics in Oklahoma City, OK for their invaluable partnership during recruitment. Research reported in this publication was supported by the National Institute of General Medical Sciences of the National Institutes of Health under Award Number U54GM104938 to the Oklahoma Shared Clinical and Translational Resources (Dr. Lora, scholar award).

References

- Baughcum AE, Powers SW, Johnson SB, Chamberlin LA, Deeks CM, Jain A, Whitaker RC. Maternal feeding practices and beliefs and their relationships to overweight in early childhood. *Journal of Developmental and Behavioral Pediatrics*. 2001; 22(6):391–408. [PubMed: 11773804]
- Beck AL, Patel A, Madsen K. Trends in sugar-sweetened beverage and 100% fruit juice consumption among California children. *Academic Pediatrics*. 2013; 13(4):364–370. doi:10.1016/j.acap.2013.02.010. [PubMed: 23688439]
- Birch LL. Child feeding practices and the etiology of obesity. *Obesity (Silver Spring)*. 2006; 14(3): 343–344. doi:10.1038/oby.2006.45. [PubMed: 16648602]
- Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatric Clinics of North America*. 2001; 48(4):893–907. [PubMed: 11494642]
- Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices

- about child feeding and obesity proneness. *Appetite*. 2001; 36(3):201–210. doi:10.1006/appe.2001.0398. [PubMed: 11358344]
- Braveman, P.; r, S. Overcoming obstacles to health. Princeton, NJ: 2008.
- Carnell S, Wardle J. Measuring behavioural susceptibility to obesity: validation of the child eating behaviour questionnaire. *Appetite*. 2007; 48(1):104–113. doi:10.1016/j.appet.2006.07.075. [PubMed: 16962207]
- Carper JL, Orlet Fisher J, Birch LL. Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite*. 2000; 35(2):121–129. doi:10.1006/appe.2000.0343. [PubMed: 10986105]
- Centers for Disease Control and Prevention. Children's BMI Tool for Schools - Assessing Your Weight: Children's BMI Tool for Schools. 2014. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/childrens_BMI/tool_for_schools.html
- Centers for Disease Control and Prevention. About BMI for Adults. 2015. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html
- Davis JN, Koleilat M, Shearrer GE, Whaley SE. Association of infant feeding and dietary intake on obesity prevalence in low-income toddlers. *Obesity (Silver Spring)*. 2014; 22(4):1103–1111. doi:10.1002/oby.20644. [PubMed: 24123802]
- Davison KK, Birch LL. Childhood overweight: a contextual model and recommendations for future research. *Obesity Reviews*. 2001; 2(3):159–171. [PubMed: 12120101]
- Evans A, Seth JG, Smith S, Harris KK, Loyo J, Spaulding C, Gottlieb N. Parental feeding practices and concerns related to child underweight, picky eating, and using food to calm differ according to ethnicity/race, acculturation, and income. *Maternal and Child Health Journal*. 2011; 15(7):899–909. doi:10.1007/s10995-009-0526-6. [PubMed: 19771501]
- Ferris, AM.; Wakefield, D.; Lora, KR.; Quesada, C. Caretakers receiving SNAP are responsive to education to reduce preschool child sugar-sweetened beverage (SSB) consumption; Paper presented at the 42nd Annual Society of Nutrition Education & Experimental Biology; San Diego, CA. 2014.
- Fraser JS, McCabe H, Ricciardelli M, Milgrom L, J. Baur J. Paternal influences on children's weight gain: a systematic review *Fathering: A Journal of Theory, Research, and Practice about Men as Fathers*. 2011; 9:252–267.
- Fuemmeler BF, Lovelady CA, Zucker NL, Ostbye T. Parental obesity moderates the relationship between childhood appetitive traits and weight. *Obesity (Silver Spring)*. 2013; 21(4):815–823. doi:10.1002/oby.20144. [PubMed: 23712985]
- Gibson, RS. Principles of Nutritional Assessment. 2nd. Oxford University Press; New York: 2005.
- Guerrero AD, Chung PJ. Racial and Ethnic Disparities in Dietary Intake among California Children. *Journal of the Academy of Nutrition and Dietetics*. 2016; 116(3):439–448. doi:10.1016/j.jand.2015.08.019. [PubMed: 26433453]
- Han E, Powell LM. Consumption patterns of sugar-sweetened beverages in the United States. *Journal of the Academy of Nutrition and Dietetics*. 2013; 113(1):43–53. doi:10.1016/j.jand.2012.09.016. [PubMed: 23260723]
- Harris TS, Ramsey M. Paternal modeling, household availability, and paternal intake as predictors of fruit, vegetable, and sweetened beverage consumption among African American children. *Appetite*. 2015; 85:171–177. doi:10.1016/j.appet.2014.11.008. [PubMed: 25447009]
- Harrison K, Bost KK, McBride BA, Donovan SM, Grigsby-Toussaint DS, Kim J, Jacobsohn GC. Toward a Developmental Conceptualization of Contributors to Overweight and Obesity in Childhood: The Six-Cs Model. *Child Development Perspectives*. 2011; 5(1):50–58. doi:10.1111/j.1750-8606.2010.00150.x.
- Haycraft E, Blissett J. Maternal and paternal controlling feeding practices: reliability and relationships with BMI. *Obesity (Silver Spring)*. 2008a; 16(7):1552–1558. doi:10.1038/oby.2008.238. [PubMed: 18421263]
- Haycraft E, Blissett J. Controlling feeding practices and psychopathology in a non-clinical sample of mothers and fathers. *Eating Behaviors*. 2008b; 9(4):484–492. doi:10.1016/j.eatbeh.2008.07.007. [PubMed: 18928912]

- Haycraft E, Blissett J. Predictors of paternal and maternal controlling feeding practices with 2- to 5-year-old children. *Journal of Nutrition Education and Behavior*. 2012; 44(5):390–397. doi:10.1016/j.jneb.2010.03.001. [PubMed: 21371945]
- Hedrick VE, Comber DL, Estabrooks PA, Savla J, Davy BM. The beverage intake questionnaire: determining initial validity and reliability. *Journal of the American Dietetic Association*. 2010; 110(8):1227–1232. doi:10.1016/j.jada.2010.05.005. [PubMed: 20656099]
- Hedrick VE, Savla J, Comber DL, Flack KD, Estabrooks PA, Nsiah-Kumi PA, Davy BM. Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): sugar-sweetened beverages and total beverage energy intake. *Journal of the Academy of Nutrition and Dietetics*. 2012; 112(6):840–849. doi:10.1016/j.jand.2012.01.023. [PubMed: 22709811]
- Hendy HM, Williams KE. Mother's feeding practices for children 3-10 years of age and their associations with child demographics. *Appetite*. 2012; 58(2):710–716. doi:10.1016/j.appet.2012.01.011. [PubMed: 22269792]
- Hoare A, Virgo-Milton M, Boak R, Gold L, Waters E, Gussy M, de Silva AM. A qualitative study of the factors that influence mothers when choosing drinks for their young children. *BMC Research Notes*. 2014; 7:430. doi:10.1186/1756-0500-7-430. [PubMed: 24997015]
- Hughes SO, Anderson CB, Power TG, Micheli N, Jaramillo S, Nicklas TA. Measuring feeding in low-income African-American and Hispanic parents. *Appetite*. 2006; 46(2):215–223. doi:10.1016/j.appet.2006.01.002. [PubMed: 16504340]
- Hughes SO, Power TG, Orlet Fisher J, Mueller S, Nicklas TA. Revisiting a neglected construct: Parenting styles in a child-feeding context. *Appetite*. 2005; 44(1):83–92. doi:10.1016/j.appet.2004.08.007. [PubMed: 15604035]
- Khandpur N, Blaine RE, Fisher JO, Davison KK. Fathers' child feeding practices: A review of the evidence. *Appetite*. 2014; 78C:110–121. doi:10.1016/j.appet.2014.03.015.
- Klohe DM, Clarke KK, George GC, Milani TJ, Hanss-Nuss H, Freeland-Graves J. Relative validity and reliability of a food frequency questionnaire for a triethnic population of 1-year-old to 3-year-old children from low-income families. *Journal of the American Dietetic Association*. 2005; 105(5):727–734. doi:10.1016/j.jada.2005.02.008. [PubMed: 15883549]
- Lora KR, Davy B, Hedrick V, Ferris A, Anderson M, Wakefield D. Assessing initial validity and reliability of a beverage intake questionnaire in Hispanic preschool-aged children. *Journal of the Academy of Nutrition and Dietetics*. 2016 doi:<http://dx.doi.org/10.1016/j.jand.2016.06.376>.
- Lora, KR.; Wakefield, D.; Ferris, A. Association of parental emotional feeding with preschool child intake of sugar-sweetened beverage; Paper presented at the Experimental Biology; San Diego, CA. 2014.
- Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *American Journal of Clinical Nutrition*. 2013; 98(4):1084–1102. doi:10.3945/ajcn.113.058362. [PubMed: 23966427]
- Mallan KM, Daniels LA, Nothard M, Nicholson JM, Wilson A, Cameron CM, Thorpe K. Dads at the dinner table. A cross-sectional study of Australian fathers' child feeding perceptions and practices. *Appetite*. 2014; 73:40–44. [PubMed: 24511617]
- Marin, G.; VanOss Marin, B. *Research with Hispanic Populations*. SAGE Publications; Newbury Park, CA: 1991.
- Musher-Eizenman D, Holub S. Comprehensive Feeding Practices Questionnaire: validation of a new measure of parental feeding practices. *Journal of Pediatric Psychology*. 2007; 32(8):960–972. doi:10.1093/jpepsy/jsm037. [PubMed: 17535817]
- Musher-Eizenman DR, de Lauzon-Guillain B, Holub SC, Leporc E, Charles MA. Child and parent characteristics related to parental feeding practices. A cross-cultural examination in the US and France. *Appetite*. 2009; 52(1):89–95. doi:10.1016/j.appet.2008.08.007. [PubMed: 18789986]
- Ogden CL, Carroll MD, Lawman HG, Fryar CD, Kruszon-Moran D, Kit BK, Flegal KM. Trends in Obesity Prevalence Among Children and Adolescents in the United States, 1988-1994 Through 2013-2014. *The Journal of the American Medical Association*. 2016; 315:2292–2299. doi:10.1001/jama.2016.6361. [PubMed: 27272581]

- Parada H, Ayala GX, Horton LA, Ibarra L, Arredondo EM. Latino fathers' feeding-related parenting strategies on children's eating. *Ecology of Food and Nutrition*. 2016; 55(3):292–307. doi: 10.1080/03670244.2016.1161616. [PubMed: 27065160]
- Park S, Li R, Birch L. Mothers' child-feeding practices are associated with children's sugar-sweetened beverage intake. *The Journal of Nutrition*. 2015; 145(4):806–812. doi:10.3945/jn.114.207233. [PubMed: 25833783]
- Parkinson KN, Drewett RF, Le Couteur AS, Adamson AJ, Gateshead Millennium Study Core T. Do maternal ratings of appetite in infants predict later Child Eating Behaviour Questionnaire scores and body mass index? *Appetite*. 2010; 54(1):186–190. doi:10.1016/j.appet.2009.10.007. [PubMed: 19887093]
- Pennington, JA.; Spungen, JS. Bowes & Church's Food Values of Portions Commonly Used. 19th. Lippincott Williams & Wilkins; Philadelphia, PA: 2010.
- Powers SW, Chamberlin LA, van Schaick KB, Sherman SN, Whitaker RC. Maternal feeding strategies, child eating behaviors, and child BMI in low-income African-American preschoolers. *Obesity (Silver Spring)*. 2006; 14(11):2026–2033. doi:10.1038/oby.2006.237. [PubMed: 17135620]
- Raaijmakers LG, Gevers DW, Teuscher D, Kremers SP, van Assema P. Emotional and instrumental feeding practices of Dutch mothers regarding foods eaten between main meals. *BMC Public Health*. 2014; 14:171. doi:10.1186/1471-2458-14-171. [PubMed: 24533574]
- Saelens BE, Ernst MM, Epstein LH. Maternal child feeding practices and obesity: a discordant sibling analysis. *The International Journal of Eating Disorders*. 2000; 27(4):459–463. [PubMed: 10744853]
- Saxton J, Carnell S, van Jaarsveld CH, Wardle J. Maternal education is associated with feeding style. *Journal of the American Dietetic Association*. 2009; 109(5):894–898. doi:10.1016/j.jada.2009.02.010. [PubMed: 19394477]
- Singh GK, Siahpush M, Kogan MD. Rising social inequalities in US childhood obesity, 2003-2007. *Annals of Epidemiology*. 2010; 20(1):40–52. doi:10.1016/j.annepidem.2009.09.008. [PubMed: 20006275]
- Skala K, Chuang RJ, Evans A, Hedberg AM, Dave J, Sharma S. Ethnic differences in the home food environment and parental food practices among families of low-income Hispanic and African-American preschoolers. *Journal of Immigrant and Minority Health*. 2012; 14(6):1014–1022. doi: 10.1007/s10903-012-9575-9. [PubMed: 22262411]
- Taveras EM, Gillman MW, Kleinman KP, Rich-Edwards JW, Rifas-Shiman SL. Reducing racial/ethnic disparities in childhood obesity: the role of early life risk factors. *JAMA Pediatrics*. 2013; 167(8): 731–738. doi:10.1001/jamapediatrics.2013.85. [PubMed: 23733179]
- Tschann JM, Gregorich SE, Penilla C, Pasch LA, de Groat CL, Flores E, Butte NF. Parental feeding practices in Mexican American families: initial test of an expanded measure. *The International Journal of Behavioral Nutrition and Physical Activity*. 2013; 10:6. doi:10.1186/1479-5868-10-6. [PubMed: 23324120]
- Tschann JM, Martinez SM, Penilla C, Gregorich SE, Pasch LA, de Groat CL, Butte NF. Parental feeding practices and child weight status in Mexican American families: a longitudinal analysis. *The International Journal of Behavioral Nutrition and Physical Activity*. 2015; 12(1):66. doi: 10.1186/s12966-015-0224-2. [PubMed: 25986057]
- US Department of Agriculture. *Dietary Guidelines for Americans* (7th). 2010
- Vollmer RL, Adamsons K, Foster JS, Mobley AR. Association of fathers' feeding practices and feeding style on preschool age children's diet quality, eating behavior and body mass index. *Appetite*. 2015; 89:274–281. doi:10.1016/j.appet.2015.02.021. [PubMed: 25700629]
- Vollmer RL, Adamsons K, Gorin A, Foster JS, Mobley AR. Investigating the Relationship of Body Mass Index, Diet Quality, and Physical Activity Level between Fathers and Their Preschool-Aged Children. *Journal of the Academy of Nutrition and Dietetics*. 2015; 115(6):919–926. doi:10.1016/j.jand.2014.12.003. [PubMed: 25650351]
- Wardle J, Carnell S, Cooke L. Parental control over feeding and children's fruit and vegetable intake: how are they related? *Journal of the American Dietetic Association*. 2005; 105(2):227–232. doi: 10.1016/j.jada.2004.11.006. [PubMed: 15668680]

- Wardle J, Guthrie CA, Sanderson S, Rapoport L. Development of the Children's Eating Behaviour Questionnaire. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*. 2001; 42(7): 963–970.
- Watowicz RP, Taylor CA. A comparison of beverage intakes in US children based on WIC participation and eligibility. *Journal of Nutrition Education and Behavior*. 2014; 46(3 Suppl):S59–64. doi:10.1016/j.jneb.2014.02.002. [PubMed: 24809998]
- Webber L, Cooke L, Hill C, Wardle J. Associations between children's appetitive traits and maternal feeding practices. *Journal of the American Dietetic Association*. 2010a; 110(11):1718–1722. doi: 10.1016/j.jada.2010.08.007. [PubMed: 21034886]
- Webber L, Cooke L, Hill C, Wardle J. Child adiposity and maternal feeding practices: a longitudinal analysis. *The American Journal of Clinical Nutrition*. 2010b; 92(6):1423–1428. doi:10.3945/ajcn.2010.30112. [PubMed: 20881070]
- Webber L, Hill C, Saxton J, Van Jaarsveld CH, Wardle J. Eating behaviour and weight in children. *International Journal of Obesity (Lond)*. 2009; 33(1):21–28. doi:10.1038/ijo.2008.219.
- Weedn AE, Ang SC, Zeman CL, Darden PM. Obesity prevalence in low-income preschool children in Oklahoma. *Clinical Pediatrics*. 2012; 51(10):917–922. doi:10.1177/0009922812441861. [PubMed: 22523274]
- Weedn AE, Hale JJ, Thompson DM, Darden PM. Trends in obesity prevalence and disparities among low-income children in Oklahoma, 2005-2010. *Childhood Obesity*. 2014; 10(4):318–325. doi: 10.1089/chi.2014.0022. [PubMed: 25019336]

Table 1

Characteristics of the fathers and children participating in the study

Variables	African-American <i>n</i> = 49	Hispanic <i>n</i> = 61	<i>df</i>	<i>p</i>
Fathers	M ± SD	M ± SD		
Age (years) ^a	36.3 ± 10.7	34.5 ± 7.4	108	0.307
	<i>n</i> (%)	<i>n</i> (%)		
Education ^b			1	0.002
High school or less	21 (43)	44 (72)		
Some college or more	28 (57)	17 (28)		
Employment			2	0.136
Full time	33 (68)	51 (83)		
Part time	6 (12)	4 (7)		
Unemployed	10 (20)	6 (10)		
Relationship status ^b			1	<0.0001
Married/partnered	28 (57)	56 (92)		
Single/divorced/widowed	21 (43)	5 (8.2)		
Federal Nutrition Assistance ^b			1	0.0008
WIC/ SNAP or Both	14 (29)	37 (61)		
None	35 (71)	24 (39)		
Father's weight ^b			1	0.198
Overweight/obese	45 (92)	51 (84)		
Normal weight	4 (8)	10 (16)		
Children	M ± SD	M ± SD		
Age (years) ^a	4.0 ± 0.9	4.1 ± 0.8	107	0.428
	<i>n</i> (%)	<i>n</i> (%)		
Gender (male) ^b	29 (59)	33 (54)	1	0.593
Child's weight			1	0.064
Overweight/obese ^b	10 (20)	21 (37)		
Normal weight	39 (80)	36 (63)		

^a*p* value for difference based on t-test.^b*p* value for difference based on chi-square test.

Table 2

Father's feeding practices, child desire to drink, and child beverage consumption

Variables	Entire Sample <i>n</i> = 110		African-American <i>n</i> = 49		Hispanic <i>n</i> = 61		<i>df</i>	^a <i>p</i>
<i>Feeding practices</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>		
Difficulty in child feeding	2.5 ± 0.8	2.5 ± 0.8	2.5 ± 0.8	2.5 ± 0.9	2.5 ± 0.9	2.5 ± 0.9	108	0.922
Concern about the child being overweight	1.8 ± 0.7	1.8 ± 0.7	1.6 ± 0.5	2.1 ± 0.8	2.1 ± 0.8	2.1 ± 0.8	101.6	<0.000
Use of food to calm	1.8 ± 0.7	1.8 ± 0.7	1.9 ± 0.8	1.7 ± 0.7	1.7 ± 0.7	1.7 ± 0.7	108	0.095
Concern about the child being underweight	2.2 ± 1.2	2.2 ± 1.2	1.8 ± 0.9	2.4 ± 1.3	2.4 ± 1.3	2.4 ± 1.3	107.3	0.004
Use of food as reward	2.9 ± 1.0	2.9 ± 1.0	2.8 ± 1.0	2.9 ± 1.1	2.9 ± 1.1	2.9 ± 1.1	108	0.649
<i>Child desire to drink</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>		
	3.1 ± 1.1	3.1 ± 1.1	3.3 ± 1.0	3.0 ± 1.2	3.0 ± 1.2	3.0 ± 1.2	108	0.156
<i>Child beverage consumption</i> (fl. oz.)	<i>M</i> ± <i>SD</i>	Median (IQR)	<i>M</i> ± <i>SD</i>	Median (IQR)	<i>M</i> ± <i>SD</i>	Median (IQR)		
Total sugar-sweetened beverages	11.2 ± 14.5	7.1 (3.2-15.0)	15.1 ± 19.2	10.2 (5.4-15.5)	8.1 ± 8.2	5.4 (2.4-10.6)	62.01	0.021
Sweetened juice drinks	4.7 ± 5.9	1.9 (1.1-1.9)	5.7 ± 6.7	3.6 (1.8-7.5)	3.9 ± 5.1	1.8 (0.7-5.0)	88.1	0.048
Sweetened carbonated drinks	2.1 ± 3.1	1.1 (0.3-2.7)	2.6 ± 3.6	1.1 (0.0-2.7)	1.7 ± 2.5	1.1 (0.3-2.0)	82.1	0.662
Other (flavored milk, sweet tea, sports drinks)	4.4 ± 8.3	1.8 (0.0-5.0)	6.7 ± 11.1	3.6 (0.7-7.0)	2.5 ± 4.2	1.1 (0.0-2.7)	59.2	0.015
Fruit juice	7.8 ± 6.5	5.4 (2.7-15.0)	8.0 ± 7.2	5.4 (2.7-10.0)	7.6 ± 6.0	5.0 (3.6-15.0)	108	0.756
Water	13.2 ± 7.2	15.0 (6.0-15.0)	13.5 ± 8.2	15.0 (6.0-22.5)	13.1 ± 6.2	15.0 (6.0-15.0)	87.8	0.799

Note. IQR refers to interquartile range.

^a *p* value for difference based on t-test.

Table 3

Fathers' feeding practices and child eating behavior associated with child intake of beverages in African-American and Hispanics¹

<i>Models and variables</i>	Total SSB			Fruit juice			Water		
	African-American β (SE)	Hispanic β (SE)		African-American β (SE)	Hispanic β (SE)		African-American β (SE)	Hispanic β (SE)	
Model 1									
Difficulty in child feeding	0.26 (0.20)	0.33 (0.18)*		0.15 (0.14)	0.09 (0.14)		-0.12 (0.10)	-0.09 (0.07)	
Child desire to drink	0.52 (0.18)***	-0.10 (0.09)		0.44 (0.13)***	0.11 (0.11)		-0.06 (0.08)	-0.03 (0.05)	
Model 2									
Concern about the child being overweight	-0.09 (0.24)	0.02 (0.18)		0.37 (0.25)	0.03 (0.16)		0.05 (0.19)	0.17 (0.10)	
Child desire to drink	0.55 (0.19)***	-0.06 (0.11)		0.49 (0.13)***	0.12 (0.11)		-0.07 (0.08)	-0.07 (0.05)	
Model 3									
Use of food to calm the child	-0.15 (0.15)	0.83 (0.31)***		0.19 (0.15)	0.07 (0.17)		-0.15 (0.10)	0.06 (0.10)	
Child desire to drink	0.61 (0.20)***	-0.15 (0.09)		0.41 (0.13)***	0.11 (0.11)		-0.04 (0.09)	-0.06 (0.05)	
Model 4									
Concern about the child being underweight	0.01 (0.13)	0.27 (0.12)**		0.07 (0.10)	-0.07 (0.08)		-0.004 (0.09)	-0.02 (0.05)	
Child desire to drink	0.56 (0.19)***	-0.11 (0.09)		0.46 (0.13)***	0.15 (0.11)		-0.08 (0.08)	-0.04 (0.06)	
Model 5									
Use of food as reward	0.26 (0.16)	0.44 (0.15)***		0.06 (0.10)	0.06 (0.10)		-0.05 (0.09)	-0.03 (0.06)	
Child desire to drink	0.50 (0.18)***	-0.10 (0.09)		0.45 (0.13)***	0.12 (0.11)		-0.07 (0.08)	-0.05 (0.05)	

¹ Multivariate adjusted regression models with dependent variables log-transformed; β estimates in table are exp(β)-1. Models were adjusted for federal nutrition assistance participation, education, relationship status, and child BMI percentile. Degrees of freedom for regression coefficients for the two samples are 1, 50 (Hispanic) and 1, 42 (African-American).

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$

Table 4

Correlations and partial correlations of fathers' feeding practices and child Body Mass Index percentile

	African American		Hispanic	
	<i>r</i>	Partial ^a <i>r</i>	<i>r</i>	Partial ^a <i>r</i>
Difficulty in child feeding	0.135	0.076	−0.206	−0.257
Concern about the child being overweight	0.256	0.283	0.216	0.176
Use of food to calm	0.004	−0.017	0.007	−0.057
Concern about the child being underweight	−0.099	−0.064	−0.314 *	−0.370 **
Use of food as reward	−0.089	−0.132	−0.052	−0.061
Child's desire to drink	0.164		0.210	

Note. Degrees of freedom for *r* and partial *r* for the two samples are 47 and 46 (African American) and 55 and 54 (Hispanic).

*
p < 0.05,

**
p < 0.01

^a Child desire to drink is partialled out of each correlation.