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Research report

Food preparation supplies predict children's family meal and home-prepared dinner consumption in low-income households ☆

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ABSTRACT

Frequent family meals and home food preparation are considered important for children's nutritional health and weight maintenance. This cross-sectional study tested whether these parent-driven behaviors are related to the availability of food preparation supplies in low-income urban households. Caregivers of children ages 6–13 provided information on family meal frequency, child consumption of home-prepared dinners, household food insecurity, and attitudes towards cooking. Researchers used a newly developed Food Preparation Checklist (FPC) to assess the availability of 41 food preparation supplies during a physical audit of the home environment. Caregivers and children provided anthropometric measurements and jointly reported on child dietary intake. In ordinal logistic regression models, greater home availability of food preparation supplies was associated with more frequent family meals and child consumption of home-prepared dinners. Associations were independent of household financial strain, food insecurity, caregiver attitudes toward cooking, and sociodemographic characteristics. Fewer food preparation supplies were available in households characterized by greater food insecurity, lower income, and negative caregiver attitudes towards cooking, but did not differ by child or caregiver weight status. As in prior studies, more frequent family meals and consumption of home-prepared dinners were associated with healthier child dietary intake in several areas. We conclude that food preparation supplies are often limited in the most socioeconomically disadvantaged households, and their availability is related to the frequency with which children consume family meals and home-prepared dinners. The potential role of food preparation supplies as contributors to socioeconomic disparities in child nutritional health and obesity deserves further study.

Introduction

Parent behaviors such as eating together as a family and preparing meals at home have an important role in socioecological models of child obesity risk (Davison, Lawson, & Coatsworth, 2012; Fiese, Hammons, & Grigsby-Toussaint, 2012). Cross-sectional and longitudinal studies support associations between frequent family meals and greater intake of healthy foods, lower intake of unhealthy foods, and lower risk of disordered eating in children and adolescents (Hammons & Fiese, 2011; Larson et al., 2013; Neumark-Sztainer, Eisenberg, Fulkerson, Story, & Larson, 2008). Though more rigorous studies are needed (Valdes, Rodriguez-Artalejo, Aguilar, Jaen-Casquero, & Royo-Bordonada, 2013), the literature also suggests an overall association between more frequent family meals and lower risk for child overweight/obesity (Goldfield et al., 2011; Hammons & Fiese, 2011; Larson et al., 2013). Americans are now cooking meals at home less often; time spent by women preparing and cleaning up food has decreased from 92 min per day in the 1970s to 51 min per day, whereas time spent by men remained stable at less than 20 min per day (Zick & Stevens, 2010). The proportion of children's daily energy eaten away from home has also increased from 23% to 33% of total intake since the 1970s (Poti & Popkin, 2011). This is problematic because intake of away-from-home meals is associated with greater overall

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intake of energy, total fat, saturated fat, and sugar in children and adolescents, with the strongest associations observed in those from lower-income households (Powell & Nguyen, 2013).

Identifying influences on family meal frequency may be important for understanding and addressing documented socioeconomic disparities in child obesity (Ogden, Lamb, Carroll, & Flegal, 2010). Family meals are more frequent in households of higher socioeconomic status (SES) (Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003), and family meal frequency has been declining in low-SES households relative to middle- and high-SES households (Neumark-Sztainer, Wall, Fulkerson, & Larson, 2013).

Very few studies have examined environmental barriers to frequent family meals and home meal preparation in low-income households. One potential barrier is a lack of meal preparation supplies in the home. Caregivers who would otherwise prepare meals at home may not do so if they lack the supplies and equipment that make cooking simpler, less effortful, and less time-consuming. Just as the availability of healthy and unhealthy foods in the home environment predicts dietary intake (Campbell et al., 2007; Fulkerson et al., 2008; Vereecken, Haerens, De Bourdeaudhuij, & Maes, 2010), the availability of food preparation supplies in the home may represent a modifiable determinant of home-prepared dinner consumption and family meal frequency. Understanding factors that promote more frequent family meals at home is important because home meal preparation is a foundational skill addressed in many dietary interventions for obesity and diabetes (Alexander, Grant, Pedrino, & Lyons, 2014; Archuleta et al., 2012; Bielamowicz, Pope, & Rice, 2013; Fulkerson et al., 2010; Thomas & Irwin, 2011), and the presence of barriers to home meal preparation could hinder treatment success.

This study tested whether the availability of food preparation supplies in the home is associated with family meal frequency and child consumption of home-prepared dinners in low-income urban households. We also evaluated the extent to which these associations were independent of several potential confounding factors, including caregiver's negative attitudes towards cooking, household financial strain, and household food insecurity. Consistent with the Theory of Planned Behavior (Ajzen, 1991), which holds that specific behaviors follow from dispositional attitudes towards the behavior and its outcomes, parents who have negative attitudes towards cooking may be less likely to both equip their household with food preparation supplies and to prepare meals at home. Similarly, a lack of food preparation supplies in low-income households may reflect the presence of financial strain, and the inability to pay for basic necessities such as electricity and heating would interfere with cooking. Food insecurity, the lack of reliable access to acceptable healthy foods, may also impede home food preparation and family meals in low-income households. Food insecurity has been implicated as a mediator in the pathway from socioeconomic disadvantage to child obesity risk, but findings have been inconsistent (Larson & Story, 2011) and food insecurity was not associated with family meal frequency or meal preparation in one recent study (Bruening, MacLehose, Loth, Story, & Neumark-Sztainer, 2012). Drawing on a socioecological framework in which a set of nested psychobiologic, sociocultural, and environmental factors jointly influence health behavior (Booth et al., 2001), we hypothesized that households with fewer meal preparation supplies would report less frequent family meals and less frequent child consumption of home-prepared dinners, independent of negative attitudes towards meal preparation, financial strain, food insecurity, and sociodemographic characteristics. Associations between family meal frequency and home-prepared dinner consumption with child dietary intake, child weight status, and primary caregiver weight status were also explored.

Method

This report describes a secondary analysis of data from the *Home Environment Comparison Study (HECS)*, a cross-sectional study designed to identify aspects of the home environment associated with childhood obesity risk in a low-income, urban population. Briefly, the parent study involved detailed audit-based assessments by research staff of the foods, media and physical activity equipment, and household resources (e.g., automobiles, internet access) available in the home environments of households with either all normal weight children or with predominantly overweight/obese children. Other variables assessed included household eating and activity routines, child dietary intake and sleep duration, and accelerometer-based estimates of physical and sedentary activity.

Subjects

Households were recruited through study advertisements posted on the Rush University Medical Center campus and internet posting forums (i.e., craigslist.org), pediatrician referrals, and word-of-mouth. Advertisements described the project as a study of the role of the home environment in children's eating habits and activity levels. Interested individuals contacted the research team to complete a telephone screening. The study included low-income households with at least one child between ages 6 and 13 years. Eligible households were located in the city of Chicago and had an annual household income $\leqslant$250% of the Federal Poverty Threshold. Recruitment focused on households with either all normal weight children or predominantly overweight/obese children. In normal weight households, all children ages 6–18 years had a body mass index <85th percentile for their age and sex. In overweight/obese households, at least 50% of children had a body mass index $\geqslant$85th percentile for their age and sex. Households in which 1–49% of children ages 6–18 were overweight or obese were excluded from the study to maximize observed group differences. Exclusion criteria included (1) serious physical illness or developmental problem in any child ages 6–13 (e.g., autism, paraplegia), (2) serious physical or psychiatric illness in a primary caregiver, (3) living in temporary or group housing or planning to move within 2 months, (4) lack of reliable telephone access, (5) lack of verbal fluency in English, or (6) unwilling to meet with researchers in the home. Eligible participants scheduled a 2-h assessment visit at the end of the telephone screening. Assessments took place at the child's primary residence. Objective height and weight measurements were taken at the beginning of the assessment visit as a final step in determining eligibility. Of 154 household screened, 103 (67%) households qualified for the study. All 103 eligible households enrolled in the study.

For measures of dietary intake, data collection focused on one index child in each household. The index child was identified as the child between ages 6 and 13 with the highest BMI percentile in overweight/obese weight households, and the lowest BMI percentile in normal weight households. Index children were selected in this way to maximize potential differences between groups. The adult caregiver who reported making the majority of food purchases for the household was identified as the index caregiver and served as the key respondent for survey measures. All questionnaires were administered verbally by the research assistant. The study was conducted in accordance with the Declaration of Helsinki. The Rush University Medical Center Institutional Review Board approved study procedures. Written informed consent from a primary caregiver and written child assent were obtained. Households received $60.00 for completing the entire study.

Measures

Family meal frequency and home-prepared dinner consumption

The frequency of family meals was assessed using a survey item from Project EAT (Larson, Neumark-Sztainer, Story, van den Berg, & Hannan, 2011), "During the past seven days, how many times did all, or most, of the people living in your household eat a meal together?" The item had seven response categories ranging from "never" to "more than 7 times." Frequency of home-prepared dinner consumption was assessed with the item, "How many days per week does your child eat a dinner that was made at home by you or someone else?" Possible responses ranged between 0 and 7 days.

Index child dietary intake

Dietary assessment focused on determining the frequency with which the index child consumed specific categories of foods previously linked to obesity risk (Ledoux, Hingle, & Baranowski, 2011; Malik, Schulze, & Hu, 2006; Rosenheck, 2008) during the past week. Caregivers aided by their young children provide the most accurate reports of child dietary intake (National Institutes of Health, Applied Research Program and Westat (Rockville, MD), 2007), therefore the index caregiver and index child jointly responded to dietary assessment items. The frequency of fruit and vegetable intake during the past week was assessed using items and the response format from the National Cancer Institute's Fruit and Vegetable Screener (Thompson et al., 2002). These items assessed intake of 100% fruit juice, fruit, lettuce salad, or vegetables other than lettuce salad or fried potatoes on a 9-point scale from "Never" (0) to "5 or more times per day" (8). Frequency of fast food intake and consumption of beverages in six categories (regular soda, diet soda, sports drinks, other sweetened beverages, milk, and coffee drinks) were assessed with a screener developed for adolescents (Nelson & Lytle, 2009). The instructions and response format were slightly modified to focus on intake in the past week, consistent with the fruit and vegetable items ("In the past 7 days, how often did you/your child eat __").

Anthropometric measurements

Height and weight of index caregivers and index children were measured in light clothing and without shoes using a scale and stadiometer (SECA models 876 and 213, Hamburg, Germany). Body mass index (BMI; kg/m^2) was calculated. For each index child, BMI percentile for age and sex was determined from the Center for Disease Control and Prevention's (2010) reference norms. For caregivers, BMIs >25.0 kg/m^2 were considered overweight/obese.

Household characteristics and socioeconomic status

Household income, number of household members, child and caregiver gender, child and caregiver race/ethnicity, and index caregiver education level and employment status (not working; part-time; full-time) were assessed via self-report. Household income was quantified as a percentage of Federal Poverty Threshold, which considers income relative to household size and composition (U.S. Census Bureau, 2011). Financial strain was assessed with the following item adapted from the Study of Women's Health Across the Nation (Green & Santoro, 2009): "How hard is it for you to pay for the very basics like food, housing, medical care, and heating?" Responses were provided on a 3-point scale from "not hard at all," somewhat hard," and "very hard." For analyses, this variable was collapsed to two categories reflecting the presence (somewhat or very hard) or absence (not at all) of financial strain. Child and caregiver ages were calculated from date of birth.

Food Preparation Checklist (FPC)

The presence of 41 food preparation supplies were assessed by researchers using an inventory developed for this project (Supplemental table). These 41 items were selected for inclusion from a comprehensive set of food preparation supplies in consultation with a registered dietitian. FPC items were distributed in 5 categories: large appliances (6 items), small appliances (6 items), cookware/bakeware (7 items), food preparation supplies (16 items), and specialty items (6 items). Items were scored as "Not present" (0), "One present" (1), or "Two or more present" (2), and had to be in usable/working order to be counted as present. The FPC total score was calculated as the sum of all 41 items. Index caregivers frequently assisted the researcher with locating items in the kitchen and other areas of the home (e.g., dining rooms, patios). However, the researcher also searched for items independently and always verified the presence of items in the home. The FPC was designed to capture the overall availability of food preparation supplies used for various aspects of food preparation, rather than document every food preparation supply available in the household.

Caregiver attitudes toward cooking

A brief measure of negative attitudes towards cooking was developed for this study. Index caregivers indicated their agreement with four statements on a 5-point Likert scale from "Strongly disagree" (1) to "Strongly agree" (5): "I do not like to cook because it takes too much time," "Cooking is frustrating," "It is too much work to cook," and "I do not like to cook because I don't like cleaning up." Scores on these four items were summed to generate an overall score for negative cooking attitudes (Cronbach $\alpha = 0.90$). The variable distribution showed substantial positive skewness of 1.34, so the sample was split into low (total score <9; average score of "disagree" or "strongly disagree") and moderate or high (total score $\geqslant$9; average score of "neutral" to "strongly agree") negative attitudes toward cooking.

Household food insecurity

The 2008 update of the United States Department of Agriculture's Household Food Security Survey (U.S. Department of Agriculture, Economic Research Service, 2012) assessed perceived restriction in the quantity, quality, or desirability of diet due to financial limitations. The survey consists of 18 items that are scored on a 0/1 basis. The sum of affirmative responses provides a total household food security score (Cronbach $\alpha = 0.85$), with higher scores representing greater food insecurity. Households were categorized as high (0), marginal (1–2), low (3–7), and very low food security (8–18) (U.S. Department of Agriculture, Economic Research Service, 2012).

Data analysis

Variable distributions were evaluated using histograms and skewness statistics. The relations of family meal frequency and home-prepared dinner consumption with index caregiver adiposity and the frequency of child dietary intake of fast food, fruit, 100% fruit juice, salad, vegetables, and several categories of beverages were tested with Spearman correlations due to the ordinal nature of these data. As the variables representing family meal frequency and home-prepared dinner consumption took the form of ordered discrete values, ordinal logistic regression models were used to test associations with these dependent variables (Ananth & Kleinbaum, 1997). In these models, frequency of home-prepared dinner consumption was collapsed to three categories comprising 2–3 ($n = 11$), 4–5 ($n = 33$), and 6 to 7 ($n = 59$) home dinners per week to obtain adequate cell sizes for modeling. Two preliminary models were run testing whether household child obesity status was associated with the frequency of family meals or child consumption of home-prepared dinners. Our primary analyses consisted of two ordinal logistic regression models in which either family meal frequency or frequency of child consumption of

home-prepared dinners were the dependent variables, and FPC total score was the independent variable. Associations are reported both with and without statistical adjustment for household food insecurity category, negative cooking attitudes, financial strain, household size, index caregiver employment status, and index caregiver education. Exploratory ordinal logistic regression models tested associations of the five FPC subscales with family meal frequency and child consumption of home-prepared dinner. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs). All analyses were conducted using Stata 11 (StataCorp LP, College Station, TX).

Results

Complete data were available for all 103 enrolled households (Table 1), which included 48 (46.6%) normal weight households and 55 (53.4%) overweight households. Index caregivers reported an average of 3.79 (SD = 1.60) family meals per week, and index children consumed an average of 5.67 (SD = 1.50) home-prepared dinners per week. Index caregiver BMI was unrelated to frequency of family meals (rho = −.08, p = .39) or child consumption of home-prepared dinners (rho = −.01, p = .90). Normal weight and overweight/obese households did not differ on frequency of family meals (OR = 0.63, 95% CI: 0.31–1.25, p = .18) or child consumption of home-prepared dinners (OR = 0.81, 95% CI: 0.38–1.74, p = .59).

Table 1
Characteristics of enrolled households (N = 103).

Household	
Household size [M (SD)]	3.9 (1.7)
Income, % of Federal Poverty Threshold [M (SD)][a]	107.0 (76.6)
Financial strain [*n* (%)]	
Absent	21 (20.4)
Present	82 (79.6)
Food security [*n* (%)]	
High	37 (35.9)
Marginal	28 (27.2)
Low	24 (23.3)
Very low	14 (13.6)
Index child	
Age, years [*M* (SD)]	10.0 (2.5)
BMI percentile [*M* (SD)]	
Normal weight households	48.2 (25.5)
Overweight/obese households	95.8 (3.9)
Female gender [*n* (%)]	54 (52.4)
Race/ethnicity [*n* (%)]	
Black/African–American	79 (76.7)
Hispanic/Latino	18 (17.5)
Multi-ethnic/Other	3 (2.9)
Non-Hispanic White/Caucasian	2 (1.9)
Asian	1 (1.0)
Index caregiver	
Age, years [*M* (SD)]	36.5 (7.4)
BMI, kg/m^2 [*M* (SD)]	33.5 (9.6)
Female gender [*n* (%)]	97 (94.2)
Race/ethnicity [*n* (%)]	
Black/African–American	79 (76.7)
Hispanic/Latino	17 (16.5)
Multi-ethnic/Other	1 (1.0)
Non-Hispanic White/Caucasian	6 (5.8)
Asian	0 (0)
Education [*n* (%)]	
High school or lower	25 (24.3)
Some college/technical school	64 (62.1)
4-year degree or higher	14 (13.6)
Employment status [*n* (%)]	
Not working	61 (59.2)
Part-time	21 (20.4)
Full-time	21 (20.4)

[a] Thresholds are set by the U.S. Census Bureau based on annual household income and the number of related adults and children in the household.

Therefore, these groups were collapsed in subsequent analyses. The pattern and statistical significance of the findings reported below were not affected when models were repeated with adjustment for household child obesity status (data not shown).

Food Preparation Checklist

The proportions of households in which each cooking item was absent, present, or present in multiple quantities are shown in Fig. 1. All 103 households had at least one refrigerator and skillet, frying pan, or wok. FPC total scores ranged from 17 to 70 (M = 42.0, SD = 11.5, median = 42) and the distribution had skewness of −0.03. More cooking supplies were present in households with higher total family income as a percentage of the Federal Poverty Threshold (rho = .21, p = .04), caregivers low on negative attitudes toward cooking ($t_{(101)}$ = 2.96, p < .01), and decreasing levels of food insecurity (linear trend: $F_{(1,99)}$ = 5.97, p = .02). FPC total scores were not associated with financial strain ($t_{(101)}$ = 0.10, p = .92), household child obesity status ($t_{(101)}$ = 0.04, p = .97), or index caregiver BMI (rho = 0.02, p = .83).

Associations with family meal frequency and home-prepared dinner consumption

Results of ordinal logistic regression models predicting frequency of family meals and child consumption of home-prepared dinners are shown in Table 2. In both crude and adjusted models, higher FPC total scores were associated with more frequent family meals (p < .01 and p = .001, respectively) and more frequent child consumption of home-prepared dinners (p = .04 and p = .03, respectively). Financial strain was also significantly associated with family meal frequency (p < .01).

Exploratory analyses tested associations of the five FPC subscales with family meal frequency and child consumption of home-prepared dinner. In unadjusted models, more frequent family meals were reported in households with a greater number of large appliances (OR = 1.47, 95% CI: 1.13–1.92, p < .01), food preparation supplies (OR = 1.08, 95% CI: 1.02–1.14, p < .01), and specialty items (OR = 1.49, 95% CI: 1.24–1.80, p < .001). The presence of small appliances (OR = 1.18, 95% CI: 0.98–1.44, p = .09) and cookware/bakeware (OR = 1.12, 95% CI: 0.95–1.33, p = .18) were not significantly associated with family meal frequency. More frequent child consumption of home-prepared dinners was reported in households with a greater number of specialty items (OR = 1.29, 95% CI: 1.05–1.58, p = .02), but not with large appliances (OR = 1.28, 95% CI: 0.96–1.70, p = .09), small appliances (OR = 1.24, 95% CI: 0.99–1.55, p = .06), food preparation supplies (OR = 1.05, 95% CI: 0.99–1.12, p = .11), or cookware/bakeware (OR = 1.12, 95% CI: 0.94–1.34, p = .21). The pattern and significance of associations was unchanged when adjusting for the covariates included in the previous models (data not shown).

Family meal frequency, home-prepared dinner consumption, and child dietary intake

Family meal frequency and home-prepared dinner consumption were moderately associated (rho = .31, p < .01). Spearman correlations involving family meal frequency, home-prepared dinner consumption and child dietary intake of fast food, beverages, fruit, salad, and other vegetables are listed in Table 3. Consumption of regular soda and other sweetened beverages were negatively associated with family meal frequency, while consumption of fruit and vegetables (except for salad and fried potatoes) were positively associated with family meal consumption. Frequency of home-prepared dinners was negatively associated with child intake of fast food, other sweetened beverages, and coffee drinks (Table 3).

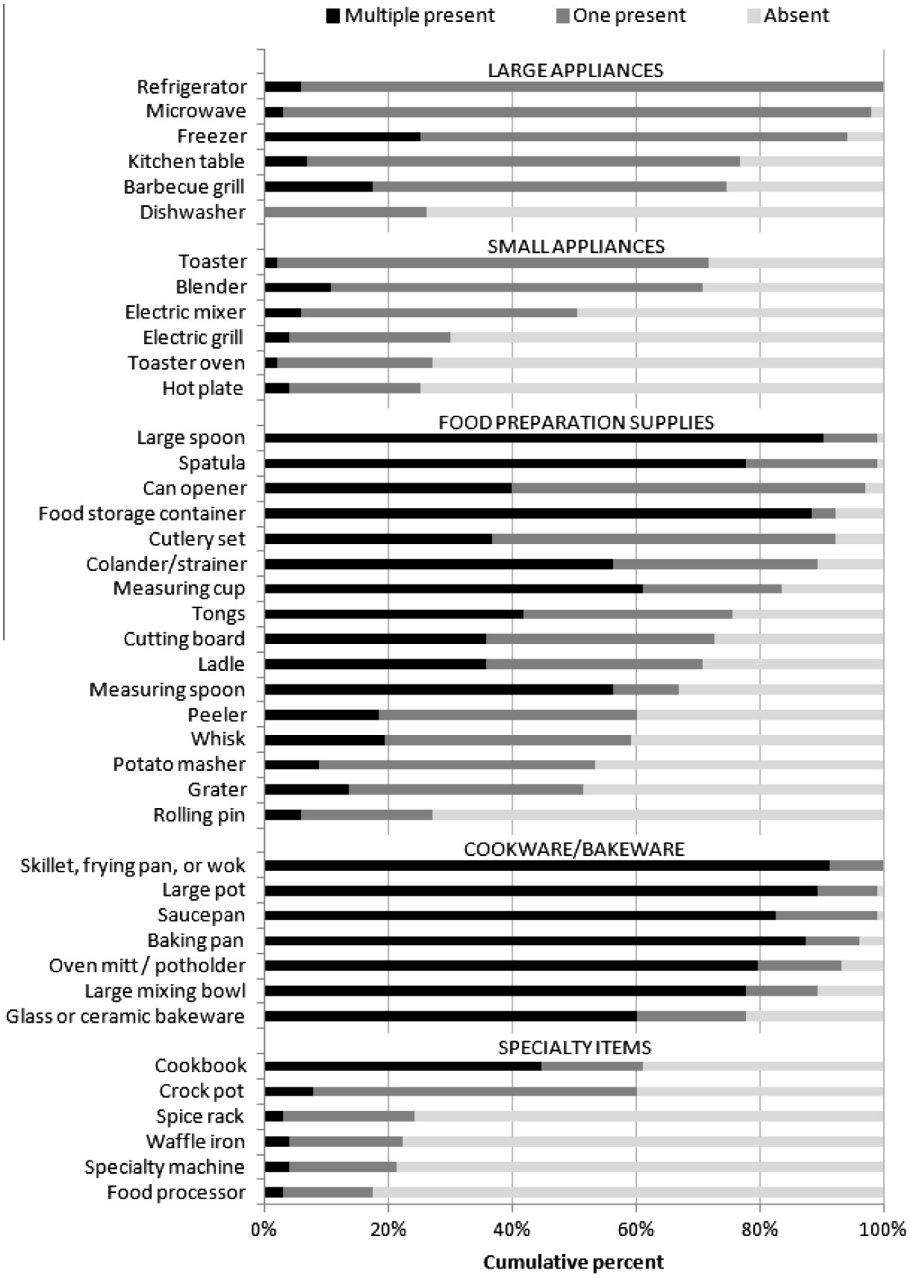

Fig. 1. Percentages of households ($N = 103$) in which Food Preparation Checklist items were absent, present, or present in multiples.

Discussion

This study tested whether the availability of food preparation supplies is associated with the family meal frequency and home-prepared dinner consumption by children in low-income urban households, which builds on research implicating these behaviors in disparities in children's diet quality and obesity risk. Findings indicate that the presence of food preparation supplies in the home is positively associated with both family meal frequency and child consumption of home-prepared dinners, over and above other explanatory variables and sociodemographic characteristics. The overall associations, as well as those involving the five FPC subscales, were stronger for family meal frequency than for home-prepared dinner consumption, which may indicate that the availability of food preparation supplies facilitates family meals other than dinners. Alternatively, the presence of food preparation supplies may be more closely related to a family's values and preference for communal eating than for home food preparation per se. Unfortunately, we are unable to test these possibilities in the current sample. Associations between food insecurity and negative caregiver attitudes towards meal preparation with family meals and home-prepared dinner consumption were not supported, despite a strong conceptual basis for these associations. Future studies should explore other factors that may influence family meals and home-prepared dinner consumption, such as caregiver perceptions of their importance for health. Greater financial strain was associated with reduced frequency of family meals, but not with home-prepared dinner consumption. One possibility is that caregivers experiencing significant financial strain may prepare children's dinners at home rather than purchase prepackaged or away-from-home meals in order to save money, rather than for the purpose of providing a family meal. Caution is needed in interpreting the reported association with financial strain as other socioeconomic factors were adjusted for in the model. The role of

Table 2
Ordinal logistic regression models ($N = 103$) predicting frequency of family meals and child consumption of home-prepared dinners, OR (95% CI).

	Family meal frequency	Home-prepared dinners[a]
Crude models		
FPC total score	1.05 (1.02–1.09)**	1.04 (1.00–1.08)*
Adjusted models		
FPC total score	1.08 (1.03–1.12)***	1.05 (1.01–1.10)*
Negative cooking attitudes		
Low	Reference	Reference
Moderate or high	1.03 (0.44–2.45)	1.34 (0.51–3.54)
Household food security status		
High	Reference	Reference
Marginal	1.51 (0.57–3.97)	0.86 (0.30–2.51)
Low	3.44 (1.29–9.18)*	1.07 (0.35–3.24)
Very low	1.94 (0.55–6.81)	1.51 (0.34–6.84)
Financial strain		
Absent	Reference	Reference
Present	0.20 (0.07–0.58)**	0.73 (0.24–2.17)
Household size	1.22 (0.97–1.55)	1.30 (0.97–1.74)
Index caregiver education		
High school or lower	Reference	Reference
Some college/technical school	0.37 (0.14–1.01)	1.07 (0.37–3.10)
4-year degree or higher	0.34 (0.08–1.41)	0.54 (0.12–2.51)
Index caregiver employment status		
Full-time	Reference	Reference
Part-time	1.57 (0.49–5.03)	0.41 (0.11–1.51)
Not working	1.08 (0.42–2.78)	1.12 (0.38–3.30)

[a] Collapsed to 3 ordinal categories comprising 2–3 ($n = 11$), 4–5 ($n = 33$), and 6–7 ($n = 59$) home dinners per week.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

financial strain in household eating patterns deserves further study.

One interpretation of these findings is that a lack of available food preparation supplies is a direct barrier to home food preparation in households that would otherwise eat home-prepared, family meals more frequently. An alternative interpretation is that the presence of food preparation supplies in the home is a marker for several unmeasured factors that may causally influence family eating patterns, including a caregiver's motivation and skill for cooking, interest in having family meals, and general level of engagement in caretaking and household responsibilities.

To our knowledge, the only prior study to examine food preparation supplies in low-income populations surveyed food assistance recipients in Oklahoma, and associations with family meal frequency or home food preparation were not examined (Landers & Shults, 2008). In the current study, multiples of most cookware/bakeware items were present in most households. Most also had one of each large kitchen appliance with the exception of a dishwasher, which were present in only 26% of households. A number of households also lacked several small kitchen appliances such as toasters and electric mixers. There was significant variability in the availability of basic food preparation supplies, and specialty items such as crockpots and food processors were rare. Many dietary interventions for both adults and families emphasize home meal preparation, and our findings suggest that the absence of food preparation supplies may be a common barrier to home cooking in low-income populations that could interfere with treatment adherence.

Table 3
Spearman correlations between family meal frequency, home-prepared dinner consumption, and child dietary intake ($N = 103$).

Dietary intake[a]	Family meal frequency (meals/week)	Home-prepared dinner consumption (dinners/week)
Fast food	−0.09	−0.24*
Regular soda	−0.22*	−0.03
Diet soda	−0.15	0.09
Sports drinks	−0.09	−0.05
Other sweetened beverages	−0.24*	−0.23*
Milk consumed as a beverage	0.16	−0.04
Coffee drinks	−0.12	−0.20*
100% fruit juice	0.02	−0.12
Fruit	0.25*	−0.01
Lettuce salad	0.16	−0.08
Vegetables (except salad and fried potatoes)	0.32**	0.19†

[a] Frequency of intake during the past week was assessed on a 9-point scale from "Never" (0) to "5 or more times per day" (8).
* $p < .05$.
** $p < .01$.
† $p = .05$.

The current findings also support the value of further research aimed at increasing home meal preparation and family meals in low-income households. The average frequency of family meals in this sample (3.8/week) was somewhat lower than observed in previous studies involving national samples (~5 meals/week) (Rollins, Belue, & Francis, 2010), but was consistent with published estimates from low-income populations (~3.6 meals/week) (Neumark-Sztainer et al., 2013). We found that more frequent family meals was associated with reduced intake of caloric beverages and greater intake of fruits and vegetables by children. The overall frequency of home-prepared dinner consumption was relatively high in this sample, but those children who consumed home-prepared dinners less frequently had greater intake of fast food and some caloric beverages. Caloric beverages, fruit, vegetables, and fast food are significant aspects of overall diet quality and are believed to promote obesity risk (Ledoux et al., 2011; Malik et al., 2006; Rosenheck, 2008). However, we did not observe associations between these behaviors and household child obesity status or index caregiver BMI, which may be due to a true lack of association (Fulkerson, Neumark-Sztainer, Hannan, & Story, 2008; Valdes et al., 2013), the study's small sample size, or ceiling effects stemming from our inclusion criteria (53% of index children and 83% of enrolled index caregivers were overweight or obese). We note that the frequency of family meals and home-prepared dinner consumption may not correspond to the content of these meals, which can vary widely across households (Neumark-Sztainer et al., 2012). Home-prepared meals that are dense in energy or served in large portions may contribute to obesity risk to an extent similar to away-from-home meals. One study involving African–American adolescents found that the use of healthy cooking methods by caregivers was associated with significantly lower odds of adolescent overweight and obesity (Kramer et al., 2012).

The Food Preparation Checklist (Supplemental Table) used in this study is a newly developed tool to assess the presence of food preparation supplies in the home environment. It is noteworthy that FPC total scores were associated with several facets of socioeconomic status, including higher household income, lower negative cooking attitudes, and lower levels of food insecurity. In addition to continuing to explore whether and how the availability of food preparation supplies in the home may influence eating patterns, dietary intake, and obesity risk in low-income populations, future work with the FPC should seek to assess inter-rater and retest reliability in larger, more inclusive samples. The FPC did not include items for ovens or stovetops. Though virtually every household in the sample had a working oven and stovetop based on our informal observations, these items are critical to food preparation and will be evaluated in a revision of the FPC.

A strength of the current study was the use of in-home assessments, which can reduce barriers to study participation in low-income populations. A second strength was the use of an audit of the home environment by a trained research assistant to assess the

presence of usable food preparation supplies, rather than relying on participant recall. A third strength was the inclusion of both family meal frequency and home-prepared dinner preparation as outcomes as these variables were only moderately associated with each other and differed in their associations with dietary intake. The study had several limitations. The sample size was modest, which limited statistical power and precluded moderator analyses. A second limitation was the use of self-report measures to assess family meal frequency and home-prepared dinner consumption, which may be subject to biased reporting. Third, child dietary intake was assessed using adapted versions of two dietary screeners that have uncertain reliability and validity in low-income children. Fourth, the recruitment strategy may have contributed to sampling bias to the extent that it was more likely to attract caregivers with greater concern for child nutrition or healthier home environments. Finally, data were cross-sectional in nature and cannot be interpreted causally.

Conclusions

In conclusion, we observed that the availability of meal preparation supplies was associated with family meal frequency and home-prepared dinner consumption by children in low-income urban households. Future studies should aim to better characterize the potential role of food preparation supplies as a mediator between socioeconomic disadvantage and child dietary intake and obesity risk, and explore whether increasing the home availability of food preparation supplies facilitates treatment success in dietary interventions that emphasize and provide skills training in home food preparation.

Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.appet.2014.01.008.

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