2015

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Citation/Publisher Attribution

Tovar, A., Choumenkovitch, S. F., Hennessy, E., Boulos, R., Must, A., Hughes, S. O.,...Economos, C. D. (2015). Low demanding parental feeding style is associated with low consumption of whole grains among children of recent immigrants. *Appetite, 95*, 211-218. https://doi.org/10.1016/j.appet.2015.06.006
Available at: https://doi.org/10.1016/j.appet.2015.06.006

Author Manuscript
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HHS Public Access
Author manuscript
Appetite. Author manuscript; available in PMC 2016 December 01.

Published in final edited form as:
Appetite. 2015 December 1; 95: 211–218. doi:10.1016/j.appet.2015.06.006.

Low Demanding Parental Feeding Styles is Associated with Low consumption of Whole Grains among Children of Recent Immigrants

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Abstract

We explored the influence of immigrant mothers feeding style on their children's fruit, vegetable and whole grain intake and how this relationship differed by mother's time in the U.S. Baseline data were collected on mother-child (3–12 yrs.) dyads enrolled in Live Well (n=313), a community-based, participatory, randomized controlled lifestyle intervention (2008–2013). Socio-demographics, years of residence in the U.S., behavioral data, and responses to the Caregiver's Feeding Styles Questionnaire (CFSQ) were obtained from the mother. Measured heights and weights were obtained for both mother and child. Child dietary intake was assessed using the Block Food Screener. Separate multiple linear regression models were run, adjusting for child and

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mother covariates. Interactions between feeding styles and years in the U.S. (<5 and ≥5 years), ethnicity, and child age were tested. Sixty-nine percent of mothers were overweight or obese, 46% of the children were overweight or obese. For mothers in the U.S. for <5 years, having a low demanding/high responsive style was associated with lower child intake of whole grains in adjusted models vs. a high demanding/high responsive style ($p<0.05$). This was not seen for mothers in the U.S. for ≥5 years. Thus, the influence of feeding style on dietary intake may change with length of time in the U.S. These hypotheses-generating findings call for future research to understand how broader socio-cultural factors influence the feeding dynamic among immigrants.

Background

Among children, the prevalence of obesity has doubled from the 1970's to the early 21st century [1–3]. Although evidence suggests that rates have stabilized among some populations, disparities among racial/ethnic and socioeconomically disadvantaged populations persist [4–6]. In particular, immigrant populations have high rates of overweight and obesity, which increase with length of time in the U.S. [7–12]. The increase in weight over time has been attributed to several factors, including financial, linguistic, and social stressors, in addition to changes in dietary and physical activity behaviors [13]. These behavioral changes are influenced by the U.S.'s "obesogenic" environment [14]. This environment is characterized by the availability of inexpensive, energy-dense foods, limited opportunities for meal-centered food preparation or sufficient physical activity, all of which could contribute to weight gain [7–10, 15–17]. Given that immigrant parents often arrive to this new environment with their children, they need to figure out how to navigate the "obesogenic" food landscape while concurrently addressing other important stressors.

Parents play a critical role in determining their child's behaviors, habits, and attitudes, and in dictating the child's physical and social environment [18, 19]. Among many other factors, parenting style may play an important role in how immigrant children navigate the food environment [20]. For example, a parent who sets rules and structure may not allow a child to have unlimited access to unhealthy foods. More specifically, parenting style describes how parents interact with their child [21] and one typology is based on two dimensions of parental behavior: responsiveness/nurturance to and demanding/control of the child [22]. Combining the two dimensions results in four parenting style typologies: authoritarian, authoritative, permissive, and uninvolved [22, 23]. This general parenting framework has been applied to the feeding domain (e.g., parental feeding styles) [24]. Although there are scant data from racial/ethnic minority and immigrant populations, findings to date suggest that the more predominant styles of feeding are a high demanding/low responsive and a low demanding/high responsive style [25, 26] [24, 25, 27–30]. Furthermore, those parents who were responsive to their child's emotional states but refrained from setting appropriate boundaries (low demanding/high responsiveness) were at the greatest risk for obesity [24, 25, 27–29].

Contributing to the elevated obesity prevalence is poor child dietary intake [31–33]. In particular, diets high in fruits, vegetables and whole grain intake provide important nutrients and reduce the risk of overweight and diabetes [34–36]. Whole grain intake has been associated with lower body mass index z-scores (BMI-z) and lower risk of overweight in children and young adults [37, 38]. The protective health benefits of fruits, vegetables and whole grains can be attributed to the presence of important nutrients, vitamins, antioxidants, and dietary fiber [39, 40]. Parental feeding styles that are more responsive to their child's requests and which set few demands have been associated with unhealthier diets in children [26, 32, 41, 42]. Given the unique situation that immigrant parents and children face in navigating a new social, cultural and physical environment, feeding styles may exert a particularly strong influence on child dietary intake. Recent immigrants, in particular, are in the process of acculturating to a new environment where psychological changes occur from simple every day behavioral changes to difficult and stressful situations [43]. In addition, the pace of acculturating to a new country may differ for parents and children [44] [45]. Parents may continue to maintain values, norms, and behaviors of their culture of origin while children may embrace the cultural attitudes and behaviors of the host country more quickly [46]. In relation to their diets Renzaho for example found that children of immigrants preferred Australian foods (i.e- energy dense snack foods) because they wanted to fit in with their peers and as a result their parents tried to control their dietary intake in hopes of retaining their traditional eating habits [47]. Unfortunately there is little evidence to understand this complex dynamic among immigrant children and parents in the US although a recent study found that children of non-US born parents had unhealthier dietary behaviors while the parents had several obesity protective behaviors [48] suggesting differential effects of an "obesogenic" environment on parents and children.

We sought to provide some of the first information about the influence of recent immigrant mothers to the U.S. feeding style on their children's dietary intake. We hypothesized that children of mothers with a low demanding/high responsive feeding style would have lower consumption of fruits, vegetables and whole grains compared to children of mothers with a high demanding/high responsive feeding style. Given the role that a new food environment may play in influencing diet behaviors among children, we explored this relationship and how it might differ for immigrants who have lived in the U.S. for up to 10 years.

Methods

Study Overview

The data for this analysis were collected at baseline (different cohorts had different baseline time points between 2009–2011) from Live Well, a community-based, participatory research study conducted in the greater Boston, MA area, which featured a randomized controlled lifestyle intervention. The central premise of Live Well was that an appropriately timed and culturally nuanced intervention, co-created by community partners and academic researchers, can prevent excess weight gain in recently arrived immigrant mothers. A total of 387 mother-child dyads had data collected at baseline. Dyads were eligible if the mother met the following criteria: resided for <10 years in the U.S., of Haitian, Latino or Brazilian descent, 20–55 years of age, not pregnant (or ≥6 months postpartum), had a child 3–12 years of age, lived in the Greater Boston area, and was willing to be randomized in to an intervention or wait-list control group. There was no weight criterion to participate in the study. Informed consent was obtained from all participants, assent for children over 7 years of age and written consent from a caregiver for children less than 7 years. Mother-child dyads attended a measurement day at a nearby community setting to complete baseline measurements. Study staff interacting with participants were bilingual in each of the participant's languages. The study was approved by the Health Sciences Boston Campus Institutional Review Board of Tufts University.

Measurements

Caregiver's Feeding Styles Questionnaire (CFSQ)—The CFSQ is a self-administered, 31-item instrument (although 19 of the items were used in the analysis) that collects information on parenting approaches in the context of feeding (e.g., feeding styles) [24]. The dimensions are measured through a series of questions, and scored on a 5-point Likert scale (never, rarely, sometimes, most of the time, always). Information about the development, reliability, and validity testing of this instrument is published elsewhere [24, 49]. The CFSQ was translated and back-translated from English into Haitian-Creole and Portuguese. A Spanish version of the CFSQ was available from prior work conducted by Hughes and colleagues [24, 49]. The back translation was compared to the original English version to ensure the concepts were the same according to approved protocol [50]. Two cognitive interviews were each conducted with native Portuguese- and Haitian-Creole-speaking immigrant mothers to verify understanding of the translated CFSQ.

Given the translations for these cultural groups, we evaluated test-retest reliability with a sub-sample of 72 participants who were enrolled in the Live Well study. The CFSQ was mailed to participants within one week of initial completion; they were asked to complete it a second time and return it within 2–3 weeks. Test-retest correlations were ($r=0.79$ ($p<0.0001$) for demanding and $r=0.73$ for responsiveness ($p<0.001$).

Reflecting a community-based, participatory research platform, all aspects of the research methodology and approach were discussed with the community partners. Live Well's partnering organizations were the Brazilian Women's Group, the Community Action Agency of Somerville, The Welcome Project, the Immigrant Service Providers Group/ Health, and the Haitian Coalition. These organizations collectively offered the Live Well study access to and knowledge of the immigrant populations involved in this research. The community partners, as well as some of the academics, believed that the use of the standard, more commonly used feeding style labels (authoritative, authoritarian, indulgent and uninvolved) were value-laden labels that had the potential to lead to biased and erroneous ethnic-specific interpretations. Discussion centered on the labels as opposed to the inherent meaning of the constructs or the specific questions on the CFSQ. Live Well's Steering Committee (comprised of community and academic partners) decided to move forward describing the feeding styles along two dimensions (demandingness and responsiveness) as they may be less subject to potential misinterpretation [30].

Height and weight were obtained from mothers and children by trained research staff. Measurements were taken in triplicate following standardized procedures [51]. Height was measured, without shoes, to the nearest eighth of an inch using a portable The Shorr Board vertical stadiometer (Shorr Production, Olney, MD). Weight was measured in light clothing, without shoes, to the nearest 0.5 lb. on a portable digital scale (Befour PS-6600 Portable Scale; Befour Inc., Saukville, WI). Body mass index (BMI) was calculated from the average of the three body weight and height measurements for each dyad (kg/m^2). Each child's BMI was transformed to a z-score (BMI-Z) relative to the age- and sex-specific CDC reference [52]. The percentile score corresponding to the z-score, and the following terminology were utilized to classify child weight status categories: underweight (<5th percentile), normal weight (5th – 84th percentile), overweight (85th – 94th percentile), and obese (≥95th percentile) [53]. Maternal weight status was classified based on her BMI; categories: underweight (<18.5), normal weight (18.5–24.9), overweight (25.0–29.9), and obese (>30.0) [54].

Child Diet Assessment—For children, diet was assessed using the 2007 Block Food screener for ages 2–17 years. This instrument has been used in various studies to assess food group intake in younger children [55, 56] and in children of similar age as the ones included in this study [57, 58]. The screener is available in Spanish; it was translated and back-translated into Haitian-Creole and Portuguese according to approved protocol [50]. This screener is designed to be interviewer-administered to children under the age of nine and interviewer-assisted for older children. It captures intake and portion size for 41 food and beverage items consumed over the past week. It was developed and adapted from the validated Block Kids 2004 Food Frequency Questionnaire (FFQ), an 80-item questionnaire designed to assess food and nutrient intakes in children 2–17 years [59]. The screener estimates daily servings of the following food groups: whole grains, fruits, vegetables (excluding potatoes), potatoes, meat/poultry/fish, dairy and legumes. The food list for this screener was created by identifying the most important sources of each of the food groups mentioned above in children aged 2 to 17 years as determined by data from two cycles of the National Health and Nutrition Examination Survey (NHANES; 2001–2002 and 2003–2004). Food groups and portion sizes were selected for age- and sex-specific categories (6). In the present study, mothers served as proxy reporters for children under the age of 6 years and therefore completed the screener. The screener was interviewer-administered for children who were between the ages of 6–9 years of age and self-administered for those who were over age 9, with the assistance of a trained data collector, as needed.

As analyzed by NutritionQuest, for each food and beverage included in the screener, the amount consumed with each food/beverage category was determined by multiplying the reported frequency of consumption (1 if eaten last week; 0 if not eaten) × the age- and sex-specific portion size consumed (small, medium or large), × the amount of each food group content in that food item. The total consumption within each food/beverage category was calculated by summing the amounts of each food group in each food item included in the screener. The primary resource for whole grains and other food group servings was the USDA MyPyramid Equivalents Database [60] which provides the number of MyPyramid equivalents (standard serving sizes) and MyPyramid major food groups and subgroups that are present in 100g of each of the foods consumed by participants in NHANES. The MyPyramid servings are defined in cups/day for fruit, vegetables, and in ounce-equivalents/day for whole grains, as described in the USDA Food Patterns [60].

Covariates—Information on potential covariates was collected through the self-administered mother's survey completed at baseline. Mothers reported their child's date of birth and gender; as well as their own age, race/ethnicity, marital status, education level, and household size and composition. Other covariates of interest included: country of birth; and number of years and/or months the respondent has lived in the US, child gender, and BMI for both mother and child.

Statistical Analysis

According to the scoring procedure for the CFSQ (19), demandingness is calculated as the total mean score across 19 items, while responsiveness is the ratio of the child-centered items over the total score of those 19 items. Dichotomization at the median within the whole sample was then used to categorize participants into high and low categories on the two dimensions resulting in a typology of the different feeding styles. The median for demandingness in this population was 3.05 and for responsiveness it was 1.11. These medians are fairly similar to those used in other diverse samples, which range from 2.6–2.8 for demandingness and 1.14–1.16 for responsiveness [24, 61–63].

The Block Food screener was not designed to measure total energy intake as there are foods, such as white bread, that are not included and thus energy intake is underestimated. For this reason, we did not include total caloric intake as a variable in the analysis. However, in our study, the approximation of total energy intake provided by the screener is deemed a suitable measure to detect participants who reported an unrealistic high intake, considering that the true caloric intake is probably higher than the one calculated by the screener. We chose an extremely conservative cut-point (5000 kcal) that represents more than double the required caloric intake for moderately active children aged 8 to 12 y old (1600–2200 kcal/day). There are no standard exclusion criteria for over- or under-reporting of food intake estimated by food screeners. For the purpose of this analysis and as previously reported [37], implausible over-reporting of food intake was defined as estimated total energy intake >20920 kJ/day (5000 kcal/day) and under-reporting of food intake as 2 or fewer food items being reported in the screener.

Of the 387 mother-child dyad data collected at baseline, 322 children completed a Block Food screener. We excluded those who reported over 5000 kcals (n=1) and who reported less than 2 foods in the screener (n=8). This resulted in a final sample size of 313 used in this analysis.

Data analysis was conducted in SAS (version 9.3). Descriptive statistics explored the frequencies, means and standard deviations of feeding styles overall and by fruits, vegetables and whole grains and other covariates (age, education, number of children in the household and marital status). Food groups (whole grains, fruits/fruit juice, vegetables (excluding potatoes) were either square root or log transformed due to skewness in their distribution, prior to analysis (geometric means ± 95% confidence intervals are reported in tables for ease of interpretation). We utilized one-way analysis of variance to compare overall means for continuous variables and bivariate analysis using chi-square to test for differences in categorical variables.

Multiple linear regression models examined the association between maternal feeding style and child's dietary intake. Separate models were built for fruits, vegetables, and whole grains. Based on previous research, we selected the high responsive/high demanding feeding style as the referent category [25, 27]. Interaction of feeding styles and years of residency in the U.S. was tested categorically: "<5 and ≥5 years" [10, 64] and continuously. Interaction of feeding styles with child age and with gender was also tested. Based on the prior literature [27, 30, 33], the following variables were adjusted for in the final models: child gender, BMI-Z and age; maternal age, ethnicity, education, and BMI.

Results

Over half of the children were male (57.4%) and the average age was 6.3 ± 2.7 years. The mother's average age was 36.0 ± 6.5 years. Overall, 28.3% of mothers had less than a high school degree; 39.9% were Brazilian, 30.7% were Latino and 29.4% were Haitian. Almost a quarter of these mothers had ≥3 children in the household and they had been in the U.S. for an average of 6.2 ± 3.2 years (Table 1). Sixty-nine percent of mothers were overweight (34%)/obese (35%), while 43% of the children were overweight/obese. Seventeen percent of mothers were categorized as being high demanding/high responsive (e.g., reasoning, complimenting with clear expectations around food consumption); 33% were high demanding/low responsive (e.g., using rewards, punishments without making exceptions or adjustments based on the child's needs); 33% were low demanding/high responsive (e.g., being warm and accepting but making few demands on the child); and 17% were low demanding/low responsive (e.g., allows child to do whatever he/she wants).

Table 2 shows the unadjusted and adjusted mean servings of fruit, vegetables and whole grains consumed by feeding style. Overall, children consumed (mean and standard deviation) 1.4±1.0 cup equivalents of fruit per day, 0.7±0.6 cup equivalents of vegetables (excluding potatoes) per day and 0.6±0.5 ounce equivalents of whole grains per day. Adjusting for age and sex, there was a non-significant trend for children of mothers with a low demanding/low responsive feeding style to consume fewer vegetable servings per day compared to children of mothers with a high demanding/high responsive style (0.46 vs. 0.65 cup equivalents/day, $p= 0.06$). In unadjusted and adjusted models, children of mothers with a low demanding/high responsive feeding style consumed statistically significant fewer servings of whole grains compared to children of mothers with a high demanding/high responsive style (0.41 vs. 0.61, $p<0.05$).

For vegetables excluding potatoes and for whole grains, a statistically significant interaction was found between feeding style and time in the country. Therefore we present our analysis stratified by families who have lived in in the U.S. for <5 years and those who have been in the U.S. for ≥5 years, up to 10 years, per study inclusion criteria (Table 3). For those who have been in the U.S. for <5 years, in age and sex adjusted models, having a low demanding/high responsive and a low demanding/low responsive style was associated with lower consumption of whole grains compared to a high demanding/high responsive style (0.38 vs. 0.94, $p<0.05$), (Table 3). Adjusting for other confounding variables (age, sex, BMI-Z of child and marital status, age, ethnic group and education of mother), having a low demanding/high responsive style is associated with lower consumption of whole grains compared to a high demanding/high responsive style (0.33 vs. 0.79, $p<0.05$). In age and sex adjusted models, having a low demanding/high responsive style is associated with lower consumption of vegetables (0.53 vs. 1.04, $p<0.05$) and a low demanding/low responsive style is marginally associated with lower consumption of vegetables (0.48 vs. 1.04, =0.07), although this association did not reach statistical significance. After adjusting for other confounding variables, differences by feeding style and vegetable consumption were not observed. For those that have been in the U.S. for ≥5 years, no difference was observed. Interactions between feeding style and ethnicity, and feeding style and child age were non-significant.

Discussion

Given the important role that parents play in influencing child's dietary intake the goal of this study was to explore how feeding style influences fruit, vegetable and whole grain intake (dietary behaviors that have been associated with risk of obesity and diabetes) and explore how it may differ for immigrants who have been in the U.S. for up to 10 years. We found that among this diverse group of immigrant children, similar to other racial/ethnic groups [25, 26] [24, 25, 27–29], the majority of immigrant mothers were categorized into having a high demanding/low responsive or low demanding/ high responsive feeding style. In multivariate analysis, we found that low demanding/high responsive and low demanding/low responsive feeding styles are associated with lower consumption of whole grains, compared to a high demanding/high responsive style, but only for those who have been living in the U.S. for <5 years.

Although the finding that a low demanding feeding style is associated with a lower consumption of whole grains is consistent with prior literature, to our knowledge this is the first report of this association among a population of recently arrived immigrants and that time in the U.S. moderates this association. The reason for our findings can be explained by different possible hypothesis. First, it is possible that families, who have been in the U.S. for less time, are facing more acculturative stress, and have several other stressors (language barriers, media literacy, discrimination etc.) compared to those who have already been in the U.S. for a longer period of time. In these families, having a less demanding and more responsive style that provides fewer rules around vegetables and whole grain consumption is worse given their recent exposure to a less abundant food environment where saying "yes" more often was healthy and in fact, needed. In conjunction with this stressful transition, it is also possible that with the novelty of an "obesogenic" food environment, whereby high energy dense food is readily available, mothers with an already low demanding style may find it easier to say "yes" to less healthy food requests, especially if the child is vocal about stating what he/she wants. Over time, they may adjust their feeding practices in order to navigate the U.S. food environment. Children of immigrant parents may also be acculturating at a different pace than their parents and find more of an urgency to belong to endorse the values and norms of the host culture [46]. Interestingly, African immigrant mothers in Australia reported that they wanted to try and maintain their traditional foods because their children were so drawn to junk food, yet often found it hard to do with their children. In fact, they reported using junk foods of the new country as a reward for eating their traditional foods [47]. It is also possible that mothers with a high demanding/high responsive style who have been in the U.S. for more than 5 years have acculturated into a different food environment where they demand less healthy foods. These findings are hypothesis generating and call for future research to explore the role of acculturation on parental feeding and exploring how feeding practices may change as they navigate an environment where access and availability to healthy foods is often limited and costly.

Why we observe this interaction as significant with only whole grains, of marginal significance with vegetables, and not with fruits is unclear. The U.S. diet is characterized by refined grains, in particular pizza being one of the top foods that children consume [65, 66] and a major contributor to total energy intake and saturated fat in children [67]. Since whole grains can be an important component of the traditional Hispanic [68], Brazilian and Haitian diet, immigrant children upon arrival to the U.S., may be displacing the more traditional whole grains for refined grains. This may be especially true for immigrant children living in households with low demanding/high responsive parental feeding styles. It may be that children begin requesting more refined grain snack foods when in the U.S., which may be driving this interaction for this food group. It is possible that having a low demanding/high responsive style maybe be more problematic for newly arrived immigrants since saying "yes" or allowing their child to eat with fewer demands may have not been a problem in their countries of origin where unhealthy food was less abundant. Future research is needed to confirm this and explore how different foods and their marketing to children may influence a child's behavior and in turn the parents' feeding response across cultural groups.

Our findings should be interpreted within the context of the limitations of the study. Although our sample represents a diverse group of mother–child dyads, generalizability may be limited given the focus on families from Brazil, Haiti and Latin America (predominately Central and South America). As a cross-sectional study, one cannot discern the direction of influence, nor look at change over time. For example, we do not know about the children's diets before coming to the U.S., and whether maternal feeding styles changed based on their home country. We also did not assess acculturation with other measures such as language spoken in the home or a scale. Further, mothers are not parenting in isolation, but in response to several factors including child traits. Thus, the parent–child relationship is bi-directional and additional studies are needed to understand causal pathways between parenting behaviors (from both mothers and fathers) and child dietary intake. Although our overall sample is relatively large, once stratified by years of residence in the U.S. and by feeding style, sample sizes within cells decreased and power to discern differences is limited. Although we had information on years in the U.S.; we did not gather specific information on how the acculturative process may influence the feeding dynamics or other aspects of socio-cultural norms. Lastly, a recognized limitation is that the assessment of diet in children is particularly challenging. The Block Food screener used in the present study was specifically designed to calculate number of servings of whole grain intake in this age group. This screener assessed a limited number of foods consumed in the past week and was not designed to calculate energy intake, which hindered our ability to adjust for total energy intake. However, total energy may potentially be one of the mechanisms by which intake of whole grains is associated with weight, in which case adjustment for total energy would not be appropriate.

Conclusion

A low demanding parental feeding style was associated with lower consumption of vegetables (in age and sex adjusted models) and whole grains, but only for those families who have been living in the U.S. for <5 years. Practitioners should be aware of the potential influence that acculturating to a new environment has on how immigrant parents feed their children. Future research is needed to understand how immigrating to the U.S. and its broader socio-cultural factors influence the feeding dynamic. With this information, culturally appropriate prevention and treatment programs can be designed.

Acknowledgments

We would like to thank these members of the Live Well Steering Committee (Nesly Metayer, Franklin Dalembert, Warren Goldstein-Gelb, Maria Landaverde, Melissa McWhinney, Joyce Guilhermino de Pádua, Christina Luongo Kamins, Helen Sinzker, Sarah Sliwa, Kerline Tofuri, and Ismael Vasquez). In addition, we thank the Live Well women and children, for their participation in this study. We would also like to acknowledge support from the Boston Nutrition Obesity Research Center (DK046200).

Funding for this research was provided by grant 5R01HD057841 from the National Institutes of Health, Bethesda MD. Postdoctoral research funds for Alison Tovar were provided by a supplement from this grant.

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Highlights

- Influence of mother's feeding and child whole-grain intake differs by time in U.S.
- Mothers in U.S. <5 years, with low-demanding style had child eating fewer whole grains
- Socio-environmental influences on feeding among immigrants need to be understood

Table 1

Characteristics of the Live Well Study Population of Children who Completed a Food Frequency Questionnaire

	Total (n=313)	
	n	**%**
Socio-demographic Variables		
Child Characteristics		
Male	178.0	57.4
Age (mean, SD)	6.3	2.7
BMIz-score (mean, SD)	0.9	1.2
Overweight/Obese	133.0	42.5
Maternal Characteristics		
Age (mean, SD)	36.0	6.5
Education		
Less than high school	87.0	28.3
High school, trade/technical school	140.0	45.6
Some college/college graduate/graduate	80.0	26.1
Ethnic group		
Brazilian	125.0	39.9
Latino	96.0	30.7
Haitian	92.0	29.4
Marital status		
Never married	95.0	31.3
Married	167.0	54.9
Separated/Divorced/Widowed	42.0	13.8
Number of children in the household		
1	101.0	34.0
2	132.0	44.4
≥3	64.0	21.6
BMI Categories (kg/m^2)		
Underweight <18.5	1.0	0.3
Normal weight 18.5–24.9	94.0	30.7
Overweight 25–29.9	103.0	33.7
Obese > 30.0	108.0	35.3
Years of residence in U.S. (Mean, SD)	6.2	3.2

Table 2

Fruit, Vegetable and Whole Grain Intake of the Live Well Children by Feeding Styles

	High Demanding High Responsive (n=53)		**High Demanding Low Responsive (n=100)**		**Low Demanding/High Responsive (n=101)**		**Low Demanding/Low Responsive (n=53)**	
	Mean	**95% CI**	**Mean**	**95% CI**	**Mean**	**95% CI**	**Mean**	**95% CI**
Fruit/fruit juice (cup equivalents)								
Unadjusted	1.25	1.02–1.50	1.25	1.09–1.43	1.42	1.24–1.60	1.19	0.97–1.44
Age and sex-adjusted	1.20	0.98–1.45	1.23	1.07–1.41	1.40	1.23–1.59	1.20	0.98–1.44
Adjusted other covariates*	1.20	0.95–1.47	1.23	1.04–1.43	1.45	1.25–1.67	1.27	1.02–1.53
Vegetables (excluding potatoes, cup equivalents)								
Unadjusted	0.64	0.52–0.80	0.51	0.43–0.60	0.55	0.47–0.65	0.47	0.37–0.58
Age and sex-adjusted	0.65	0.52–0.81	0.51	0.44–0.60	0.54	0.46–0.63	0.46	0.37–0.57
Adjusted other covariates*	0.63	0.49–0.80	0.51	0.42–0.61	0.58	0.48–0.69	0.52	0.41–0.65
Whole grains (ounce equivalents)								
Unadjusted	0.63	0.49–0.78	0.48	0.40–0.58	**0.40**	0.33–0.49	0.44	0.33–0.57
Age- and sex-adjusted	0.62	0.49–0.77	0.49	0.40–0.58	**0.39**	0.31–0.48	0.43	0.33–0.56
Adjusted other covariates*	0.61	0.47–0.77	0.48	0.39–0.59	**0.41**	0.33–0.51	0.52	0.40–0.66

*Other covariates: adjusted by age, sex, BMI-Z of child and marital status, age, ethnic group and education of mother; **$p < 0.05$**

Tables 3

Adjusted Mean Servings of Vegetables and Whole Grains by Feeding Style Stratified by time in the U.S.

	High Demanding/High Responsive (n=16)		High Demanding/Low Responsive (n=33)		Low Demanding/High Responsive (n=27)		Low Demanding/Low Responsive (n=10)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<5years in the U.S. Vegetables (excluding potatoes, cup equivalents)								
Unadjusted	1.0	0.66–1.05	0.66	0.49–0.87	0.54	0.39–0.74	0.48	0.28–0.81
Age-Sex adjusted	1.04	0.68–1.57	0.66	0.49–0.88	**0.53**	0.38–0.72	0.48	0.28–0.81
Adjusted other covariates*	0.99	0.58–1.69	0.64	0.43–0.94	0.52	0.36–0.75	0.47	0.25–0.84
Whole grains								
Unadjusted	0.93	0.63–1.27	0.59	0.42–0.78	**0.38**	0.24–0.56	**0.38**	0.16–0.68
Age-Sex adjusted	0.94	0.64–1.30	0.59	0.42–0.78	**0.38**	0.23–0.55	**0.38**	0.16–0.69
Adjusted other covariates*	0.79	0.45–1.22	0.48	0.29–0.72	**0.33**	0.18–0.52	0.36	0.13–0.70
>5 years in the U.S.								
	n=36		**n=64**		**n=72**		**n=41**	
Vegetables (excluding potatoes, cup equivalents)								
Unadjusted	0.53	0.41–0.68	0.44	0.36–0.53	0.56	0.47–0.68	0.45	0.36–0.58
Age-Sex adjusted	0.52	0.40–0.68	0.44	0.37–0.54	0.55	0.46–0.66	0.44	0.35–0.56
Adjusted other covariates*	0.53	0.40–0.71	0.46	0.36–0.59	0.60	0.47–0.76	0.52	0.39–0.69
Whole grains								
Unadjusted	0.51	0.37–0.68	0.44	0.33–0.55	0.41	0.32–0.52	0.46	0.33–0.62
Age-Sex adjusted	0.50	0.36–0.66	0.45	0.34–0.56	0.39	0.30–0.49	0.44	0.32–0.58
Adjusted other covariates*	0.53	0.38–0.70	0.46	0.34–0.59	0.41	0.30–0.54	0.57	0.41–0.75

* adjusted by age, sex, BMI-Z of child and marital status, age, ethnic group and education of mother; **p < 0.05**