



Published in final edited form as:

*Obesity (Silver Spring)*. 2015 April ; 23(4): 840–846. doi:10.1002/oby.20986.

## The Relationship Between Acculturation and Infant Feeding Styles in a Latino Population

Liz Dancel, MD MPH<sup>1</sup>, Eliana Perrin, MD MPH<sup>2</sup>, H. Shonna Yin, MD MS<sup>3</sup>, Lee Sanders, MD MPH<sup>4</sup>, Alan Delamater, PhD<sup>4</sup>, Krista M. Perreira, PhD<sup>5</sup>, Andrea B. Bronaugh, BA<sup>6</sup>, Svetlana Eden, MS<sup>7</sup>, Ayumi Shintani, PhD MPH<sup>7</sup>, and Russell Rothman, MD MPP<sup>6</sup>

<sup>1</sup>Pediatric Gastroenterology, Greenville Health System, University of South Carolina - Greenville, Greenville, SC

<sup>2</sup>Pediatrics, University of North Carolina, Chapel Hill, NC

<sup>3</sup>Pediatrics, New York University, New York, NY

<sup>4</sup>Pediatrics, University of Miami, Miami, FL

<sup>5</sup>Public Policy, University of North Carolina, Chapel Hill, NC

<sup>6</sup>Center for Health Services Research, Vanderbilt University Medical Center, Nashville, TN

<sup>7</sup>Biostatistics, Vanderbilt University Medical Center, Nashville, TN

### Abstract

**Objective**—To assess the relationship between parental acculturation and infant feeding style in a sample of Latino parents.

**Design and Methods**—A post-hoc analysis was performed using data from an ongoing four-site RCT to promote early childhood obesity prevention. Cross-sectional data of parent-child dyads at the 12 month well-child visit who self-reported their Latino ethnicity were analyzed. The Short Acculturation Scale for Hispanics (SASH) and a subset of the Infant Feeding Style Questionnaire (IFSQ) that assessed four primary feeding styles were administered. Analyses compared SASH level (low v. high) with each feeding style.

---

Users may view, print, copy, and download text and data-mine the content in such documents, for the purposes of academic research, subject always to the full Conditions of use:[http://www.nature.com/authors/editorial\\_policies/license.html#terms](http://www.nature.com/authors/editorial_policies/license.html#terms)

**CORRESPONDENCE:** Russell L. Rothman, MD, MPP, Vanderbilt University Medical Center, Vanderbilt Center for Health Services Research, Internal Medicine and Pediatrics, Suite 6000 Medical Center East, Nashville, TN 37232-8300, russell.rothman@vanderbilt.edu.

**CONFLICTS OF INTEREST:** The remaining authors have no conflicts of interest to disclose.

**AUTHOR CONTRIBUTIONS:** Dr. Dancel helped conceptualize and design the study, helped develop the analysis plan, drafted the initial manuscript, and reviewed and revised the manuscript according to feedback; Drs. Perrin, Yin, Sanders, and Delamater helped conceptualize and design the study, helped design the data collection instruments, helped develop data collection protocols at all 4 sites, supervised data collection at 1 site, helped develop the analysis plan, and reviewed and revised the manuscript according to feedback; Dr. Perreira helped design the data collection instruments and reviewed and revised the manuscript; Ms. Bronaugh designed and managed the study database, supervised data collection at all 4 sites, and reviewed and revised the manuscript; Ms. Eden helped develop the analysis plan, helped analyze the data, and reviewed and revised the manuscript; Dr. Shintani supervised the development of the analysis plan, supervised the analysis of the data, and reviewed and revised the manuscript; Dr. Rothman helped conceptualize and design the study, helped design the data collection instruments, helped develop data collection protocols at all 4 sites, supervised data collection at 1 site, helped develop the analysis plan, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

**Results**—Complete SASH data was available for 398 of 431 Latino dyads. Median SASH score was 1.8 (IQR 1.4 – 2.7); 82% of participants had low acculturation (score < 3). Of the nine outcome variables, four were significantly associated with SASH: “Laissez-Faire/attention” (AOR 2.3 [95% CI 1.06 – 5.13], p=0.004), “Laissez-Faire/diet quality” (3.9 [1.7 – 8.75], p=0.005), “Pressuring as soothing” (3.6 [1.63 – 8.05], p=0.007) and “Restrictive/diet quality” (0.4 [0.19 – 0.94], p=0.031).

**Conclusions**—Latino parents with lower acculturation were more likely than those with higher acculturation to endorse feeding styles that are associated with child obesity. Further research is needed to determine why acculturation and feeding style relate.

### Keywords

Acculturation; infant feeding styles; pediatric obesity prevention

---

### Introduction

The obesity epidemic continues to be a significant healthcare issue. According to recent data from the National Health and Nutrition Examination Survey (NHANES), children 2–19 years of age have a prevalence of 31% and 16% of overweight (body mass index [BMI] of 85<sup>th</sup> percentile for age and sex) and obesity (BMI 95<sup>th</sup> percentile), respectively<sup>1</sup>, with rates highest among Hispanic and non-Hispanic African-American children.<sup>2</sup> In the preschool population specifically (ages 2–5 years), the prevalence is 24% and 11%, respectively.<sup>1</sup> Obesity prevention remains an important area of investigation as children who are overweight by the age of two years are two to five times more likely to become overweight or obese during their adolescent years.<sup>3</sup> It is hoped that by focusing efforts on young children, healthy behaviors of diet and physical activity will be formed early and will therefore be sustained throughout childhood and adolescence.

Childhood obesity in the Latino population remains an ongoing focus of attention given their disproportionately high rates of obesity compared to non-Hispanic whites. Prior studies investigating the relationship between acculturation and health outcomes and obesity have produced conflicting results.<sup>4</sup> While the definition of acculturation is complex, it has traditionally been defined as the process by which the attitudes, values, beliefs, and behaviors of one culture are adopted by another culture.<sup>5</sup> The measurement of acculturation can be challenging. In addition to assessing primary language spoken, studies in the past have measured acculturation using place of birth and years of residence in the U.S.<sup>6</sup> There is criticism, however, regarding the validity of these measurements as proxies for a very complex construct.<sup>7</sup>

One way in which acculturation may influence the development of child obesity is through parental feeding styles. The complex relationship between caregiver and child with respect to responsiveness to hunger and satiety cues and feeding practices has been associated with weight outcomes.<sup>8</sup> Specific parental feeding styles including pressuring, controlling, responsive, and indulgent, have been studied in relation to food intake and weight status in children.<sup>9–11</sup> Even though the rate of overweight and obesity is increasing faster in the

African-American and Latino populations, most research on feeding styles and their link to obesity has been conducted in school-aged white children.<sup>12–13</sup>

Previous studies examining the relationship between acculturation and feeding styles have often been limited by: (1) poor measure of acculturation, (2) inadequate assessment of dietary behaviors, and (3) focus on older children. The purpose of this paper is to assess the relationship between parental acculturation and infant feeding styles at 12 months of age in a sample of Latinos.

## Methods

### Study Sample

The Greenlight study is an ongoing multicenter, cluster randomized controlled trial evaluating the effectiveness of health communication training and the use of a low-literacy/low-numeracy educational toolkit to prevent obesity in infants and children.<sup>14</sup> Caregiver-infant dyads from under-resourced communities are enrolled at 2 months of age and followed at each well-child visit until they reach the age of two years. Dyads were enrolled from four participating academic pediatric primary care clinics (affiliated with Vanderbilt University, New York University, the University of Miami, and the University of North Carolina-Chapel Hill), with two sites implementing the obesity prevention intervention and the other two sites acting as an attention control with implementation of an injury prevention program.

Inclusion criteria for the caregiver-infant dyad were: infant between the ages of 6 and 16 weeks and presenting for the 2 month well-child visit, caregiver's primary language of English or Spanish, and caregiver agreeing to bring the child to all well-child visits until he reaches the age of 2 years. Exclusion criteria related to the infant were: prematurity less than 34 weeks gestational age or birth weight less than 1500 grams, weight for length of less than the 3<sup>rd</sup> percentile at the 2 month well-child visit, or prior diagnosis of failure to thrive or other known medical condition with associated feeding or nutrition issues. Exclusion criteria related to the caregiver were: age less than 18 years, mental or neurologic condition that could impair his/her ability to participate, and poor visual acuity (defined as worse than 20/50 using the Rosenbaum Pocket Screener) at the time of enrollment.

Written and verbal informed consent was obtained from each caregiver in his/her primary language (English or Spanish only). This study was approved by the Institutional Review Boards from the four participating academic centers.

### Measures

Infant baseline data collected upon enrollment included race, birth history, medical history, health insurance status, as well as feeding status. Caregiver demographic data included self-reported age, country of origin, primary language, race, ethnicity, household composition, employment, income level, and education level. Relevant to this particular paper, the following measures were also obtained.

**Short Acculturation Scale for Hispanics (SASH)**—This validated 12-item measure that assesses language preference for personal, social, and media use<sup>15</sup> was administered at the time of enrollment in the caregiver’s primary language (English or Spanish) to all caregivers who self-identified as Latino. Our study used the SASH as it is a more robust measure of acculturation than primary language spoken or years of residence in the U.S. as used by prior studies. Example items from this questionnaire include: “In general, what language(s) do you read and speak?” “What language(s) do you usually speak with your friends?” “In what language(s) are the TV programs you usually watch?” Answer choices were on a 5-point scale: 1 = only Spanish, 2 = Spanish better than English, 3 = both equally, 4 = English better than Spanish, and 5 = only English. A mean acculturation score was calculated for each participant with a range score of 1 – 5. Low acculturation was defined by the scale developers as having a mean SASH score 2.99.<sup>15</sup>

**Infant Feeding Style Questionnaire (IFSQ)**—Four domains of the IFSQ were administered in the caregiver’s primary language (English or Spanish) during the 12 month well-child visit. The English version of the IFSQ was developed and validated in a group of African-American children aged 3–20 months.<sup>16</sup> This measure assesses behaviors and beliefs on five main feeding styles and their subdomains: “Laissez-Faire” (diet quality, attention), “Pressuring” (pressuring to finish, pressuring with cereal, pressuring as soothing), “Restrictive” (amount, diet quality), “Responsive” (satiety, attention), and “Indulgence” (permissive, coaxing, soothing, and pampering). For the Greenlight study, the “Indulgence” domain was excluded due to the paucity of data relating to its validity as well as the overall low prevalence of these behaviors in the original development paper.<sup>16</sup>

The remaining 4 domains of the IFSQ that were administered included 51 items in 9 subdomains that comprised our primary outcomes. Each item of the IFSQ is assessed using a 5-point Likert scale with the following response options: disagree/never, slightly disagree/seldom, neutral/half of the time, slightly agree/most of the time, agree/always. Each IFSQ subdomain score was calculated by taking the mean of all items in each subdomain with a higher score representing endorsement of those behaviors and beliefs (range score of 1 – 5). Sample items from each subdomain are listed in Table 1. Spanish translation of the IFSQ was completed as part of the Latino Infant Nutrition Study.<sup>17</sup> The original questionnaire was first translated to Spanish by a native Spanish speaker, then later back translated to English by a bilingual researcher. Any discrepancies between the translations were discussed with a team of researchers who were fluent in both Spanish and English. Data from the Greenlight Study is currently being used to assess if there is measurement equivalence between the English and Spanish versions.

## Statistical Analyses

This analysis was restricted to only those families who self-reported Latino ethnicity. Patient characteristics were summarized using median and inter-quartile range (IQR) for continuous and ordinal variables, and proportions for categorical variables. Unadjusted analysis comparing SASH level (low v. high) with key patient characteristics and each of the nine outcomes of the IFSQ was performed using Wilcoxon-rank sum tests.

Proportional odds logistic regression models were used to examine the association of SASH score with each of the nine outcomes of the IFSQ. Each model was adjusted for an *a priori* defined list of variables including: patient age, patient sex, caregiver age, caregiver education (Less than High School, High School Graduate, Partial College, College or Higher), WIC status (Yes, No), income (Less than \$10,000, \$10,000–19,999, \$20,000–39,999, \$40,000 or more), and study site (Miami, UNC, Vanderbilt, NYU). Proportionality of odds assumption was assessed using a graphical method<sup>18</sup> and held reasonably well for the main predictor of interest. To check for possible multicollinearity (i.e., WIC status and income), variance inflation factor (VIF) was assessed. The maximum VIF value did not exceed a recommended threshold of 10.<sup>19</sup> The variables patient age, caregiver's age, and SASH were modeled as non-linear terms implemented by restricted cubic splines with 3 knots.<sup>18</sup> Results were reported as adjusted odds ratios (AOR) with 95% confidence intervals (95% CI). Because SASH was included in the adjusted analysis as a continuous and a non-linear variable, in order to report the effect of SASH, two points of comparison had to be chosen. We chose to compare subjects with a SASH score of 1 to subjects with a SASH score of 3. Therefore, in this paper, an AOR greater than one means that a subject with a SASH score of 1 is more likely to have a higher outcome score compared to subjects with a SASH score of 3. Subjects with missing outcomes or covariate values were excluded from the analyses.

Findings with a two-sided p-value < 0.05 were considered statistically significant. All statistical analyses were performed using statistical package R statistical software version 2.15.0 (2012-03-30, <http://www.r-project.org>).

## Results

Enrollment of parent-child dyads into the Greenlight study is shown in Figure 1. Of the 865 dyads enrolled, 431 caregivers (49.8%) self-identified as Latino with complete SASH data available for 398 caregivers (46%). Their characteristics with stratification by acculturation level are summarized in Table 2. Ninety-six percent of caregivers and 50% of infants were female; greater than 90% of the infants were enrolled in the Women, Infants, and Children (WIC) program and had Medicaid as their insurance. Almost half (46.4%) of the caregivers were descendants from Mexico. Median SASH score was 1.8 (IQR 1.4 – 2.7, range 1 – 5) with 328 participants (82%) categorized as having low acculturation (SASH < 2.99). There were no significant differences in patient age, weight, caregiver age, or marital status between acculturation groups. Significantly more caregivers with low acculturation had less than a high school education (45.1% vs. 21.4%) and made less than \$10,000 in annual household income (39.6% vs. 17.6%). For the IFSQ completed by the Latino subset, Cronbach's alpha was calculated for each of the nine subdomains with "Laissez-Faire/attention" having an alpha of 0.37 and "Laissez-Faire/diet quality" an alpha of 0.51. All other subdomains had an alpha of > 0.6.

### Association between acculturation and infant feeding styles

The unadjusted analysis for the association between SASH and IFSQ score at the 12 month well-child visit is shown in Table 3. Complete IFSQ data was available for 284 participants

(32.8%). All nine subdomains except for “Restrictive/amount consumed” and “Responsive/attention and interactions” were statistically significantly different between the low acculturation and high acculturation groups. Low acculturation was more associated with behaviors and beliefs in the “Laissez-Faire/attention”, “Laissez-Faire/diet quality”, “Pressuring to finish”, “Pressuring with cereal”, and “Pressuring as soothing” categories. High acculturation was more associated with “Restrictive/diet quality” and “Responsive/satiety and hunger”.

The adjusted analysis for the association between SASH and IFSQ score at the 12 month well-child visit is shown in Table 4. After adjusting for patient age, patient sex, caregiver age, caregiver education, WIC status, income, and study site, four of the nine parent feeding styles remained significantly associated with acculturation: “Laissez-Faire/attention” (AOR 2.3 [95% CI 1.06 – 5.13],  $p = 0.004$ ), “Laissez-Faire/diet quality” (3.9 [1.7 – 8.75],  $p = 0.005$ ), “Pressuring as soothing” (3.6 [1.63 – 8.05],  $p = 0.007$ ) and “Restrictive/diet quality” (0.4 [0.19 – 0.94],  $p = 0.031$ ). Compared to parents with high acculturation, those with low acculturation were more likely to exhibit “Laissez-Faire/attention” behaviors, “Laissez-Faire/diet” behaviors, and “Pressuring as soothing” behaviors, and less likely to exhibit “Restrictive/diet quality” behaviors.

## Discussion

Results from this cross-sectional analysis of 12 month old Latino children show that those caregivers with low acculturation were more likely to endorse infant feeding styles that are more commonly associated with obesogenic behaviors and beliefs than did those with high acculturation. Specifically, after adjusting for various socio-economic factors that may confound our results, low acculturation was significantly associated with a more “Laissez-Faire” feeding style, more “Pressuring to soothe” behaviors, and less “Restriction” with respect to diet quality, all of which have been shown to be associated with increased weight in prior studies.<sup>20–22</sup>

This relationship between parental acculturation and feeding styles is a complex and dynamic one, often confounded by culture, geography, community, and other factors. An observational study by Sussner et al was one of the first to demonstrate an association between language use of low-income Hispanic mothers, as defined as either exclusive or non-exclusive use of their native language, and BMI of their children at two and three years of age.<sup>3</sup> It was found that children at 24 months of age were at higher risk of being overweight if there was maternal exclusive native language use, however there was no association at 36 months of age. Other measures of acculturation such as birthplace (U.S. or foreign-born) and years of residence in the U.S. (less than or greater than 8 years) were not significantly associated with BMI.<sup>3</sup> In a study of WIC participants, acculturation was measured in the Spanish-speaking participants by a single item – main language spoken in the home.<sup>23</sup> Although the study was able to elicit differences in feeding behaviors between English and Spanish-speaking participants, it failed to acknowledge the complexity of acculturation and its many factors as it relates to health. For example, acculturation has been associated with negative health effects such as substance abuse and birth outcomes (e.g. prematurity, low birthweight), positive health effects such as likelihood of preventive health

care utilization, or many times mixed or no health effects.<sup>6</sup> Unfortunately, the variability in how acculturation is measured in these studies makes it difficult for conclusions to be drawn and comparisons to be made.

Although a commonly used measure of acculturation continues to be primary language spoken, some studies have attempted to use a more robust measure using multi-item questionnaires. In a study of older children of recent immigrants, Tovar et al assessed acculturation on a 10-point Likert scale with regard to overall daily life, dietary intake, and physical activity.<sup>24</sup> Using the Caregiver's Feeding Styles Questionnaire, most mothers were categorized as having a high demanding/low responsive feeding style (many rules and little regard to the child's cues) or low demanding/high responsive feeding style (few rules and more permissive behavior), the latter of which was positively associated with weight in older children after adjusting for ethnicity and acculturation.<sup>24</sup>

Other proxies of acculturation such as length of time spent in the United States have been shown to be associated with breastfeeding initiation and duration, an area of interest for researchers given its relationship to future overweight and obesity in children.<sup>25</sup> One study showed that women who had lived in the U.S. for a shorter duration were more likely to have reported breastfeeding their infant at 2 months of age than women who lived in the U.S. longer.<sup>25</sup> These results were in keeping with previously published data that low acculturation was associated with increased breastfeeding practices.<sup>26–29</sup>

Specific feeding styles, such as indulgent, uninvolved, or permissive practices, have been shown to be more common among Latino parents than non-Latino parents.<sup>20</sup> These permissive feeding styles have been associated with consumption of more energy-dense diets and less intake of fruits and vegetables.<sup>9</sup> In a sample of 659 parents of 1–5 year olds with over half of them Latino, those who spoke Spanish primarily were more likely to use food to calm their children.<sup>30</sup> Interestingly, there were no significant differences between English-speaking Latinos and White parents suggesting a role for acculturation status rather than race or ethnicity alone.<sup>30</sup>

Our study has several strengths. Our sample population of primarily Latino women was from geographically diverse areas with four study sites serving as our reference base. Recruitment from pediatric residency continuity clinics which often serve low-income and minority patients allowed us to focus our attention on the population in which we were most interested. While those who self-identified as Latino were collectively analyzed as a group, there were participants from various countries of origin. Those who were descendants from Mexico comprised the largest subgroup, followed by U.S.-born Latinos, Central American, South American, and Caribbean. While recognizing that acculturation is likely a bidirectional process that is complex and not easily defined, by using the SASH, we were able to measure acculturation in a more robust way given it is a multi-item questionnaire factoring in personal, social, and media interaction. We felt that this measure would better characterize acculturation rather than years spent in the U.S. or primary language spoken alone. Finally, using the IFSQ strengthened our study as this measure is fairly comprehensive in evaluating both behaviors and beliefs of parental feeding styles in infants and young children.

There are also several limitations. First, we performed a cross-sectional analysis; therefore only associations are examined and conclusions regarding causation cannot be drawn. Second, although there were 431 caregiver-infant dyads that self-identified as Latino, SASH data was only available on 398 of them at study enrollment. IFSQ data at 12 months of age was complete for only 284 dyads, thus attrition was an issue. In addition, nearly all of our participants were of low socioeconomic status making the ability to generalize to all Latinos difficult. While there were representatives from various countries of origin, analyses were done on the group as a whole. It would be beneficial for future studies to assess this relationship between the different groups (descendants from Mexico vs. others; U.S.-born vs. foreign-born; time spent in the U.S.). The IFSQ was previously found valid and reliable in a low-income African-American population, but has not yet been validated in a Latino population.<sup>16</sup> Except for the “Laissez-Faire/attention” and “Laissez-Faire/diet quality” feeding styles, reliability scores were fairly good in our sample (Cronbach’s alpha between 0.63 and 0.79). The difference in internal reliability may be due to the Spanish translation process of the IFSQ as there may have been subtle differences between the two versions administered. In addition, both the SASH and the IFSQ are self-reported measures, and therefore may not represent actual beliefs and behaviors as the potential for social desirability bias may be present. Finally, while we showed an association between acculturation and the IFSQ, we recognize that this may or may not translate to actual differences in weight status.

Still, the strong observed association between acculturation and infant feeding styles may help inform clinical and community efforts to prevent childhood obesity and improve community health in the Latino population. Child obesity prevention efforts may ultimately be more beneficial when tailored to acculturation status and specific feeding practices endorsed by caregivers. Rather than providing generalized recommendations for healthy feeding practices to this population, more consistent and positive change may arise when considering one’s cultural context and acculturation status. From a public health perspective, providing effective yet culturally sensitive education and counseling for obesity prevention is extremely important for this at-risk population. Further research on the socio-cultural context as it relates to feeding practices is needed to evaluate the effect of acculturation and infant feeding styles on future overweight and obesity in Latino children.

## ACKNOWLEDGEMENTS

Dr. Perreira reports grants from National Heart Lung and Blood Institute, personal fees from Urban Institute, and grants from Robert Wood Johnson Foundation outside the submitted work.

**FUNDING:** All phases of this study were supported by the Eunice Kennedy Shriver Institute for Child Health and Development, NICHD (R01 HD049794), with supplemental funding from CDC and OBSSR (Grant #R01HD059794-04S1, R01HD059794-04S2). Parts of the study were supported the National Institutes of Health’s National Center for Advancing Translational Sciences through its Clinical and Translational Science Awards Program (CTSA), grants # 1UL1RR029893, UL1TR000445 and UL1RR025747. Dr. Yin is supported by a grant under the Robert Wood Johnson Foundation Physician Faculty Scholars Program and HRSA (12-191-1077-Academic Administrative Units in Primary Care). Funding for the development of the Spanish IFSQ was provided by the Center for Excellence in Children’s Nutrition sponsored by Mead Johnson and Company and The University of North Carolina’s Program on Ethnicity, Culture and Health Outcomes (ECHO). Additional support was provided by the Carolina Population Center (R24 HD050924).



## REFERENCES

1. Skinner AC, Skelton JA. Prevalence and trends in obesity and severe obesity among children in the United States, 1999–2012. *JAMA Pediatr.* 2014 [Epub ahead of print].
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA.* 2014; 311(8):806–814. [PubMed: 24570244]
3. Sussner KM, Lindsay AC, Peterson KE. The influence of maternal acculturation on child body mass index at age 24 months. *Journal of the American Dietetic Association.* 2009 Feb; 109(2):218–225. [PubMed: 19167948]
4. Ciampa PJ, White RO, Perrin EM, Yin HS, Sanders LM, Gayle EA, et al. The association of acculturation and health literacy, numeracy and health-related skills in Spanish-speaking caregivers of young children. *J Immigrant Minority Health.* 2013; 15:492–498.
5. Abraido-Lanza AF, Armbrister AN, Florez KR, Aguirre AN. Toward a theory-driven model of acculturation in public health research. *American Journal of Public Health.* 2006; 96:1342–1346. [PubMed: 16809597]
6. Lara M, Gamboa C, Kahramanian MI, Morales LS, Bautista DE. Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context. *Annual review of public health.* 2005; 26:367–397.
7. Ellison J, Jandorf L, Duhamel K. Assessment of the Short Acculturation Scale for Hispanics (SASH) among low-income, immigrant Hispanics. *Journal of cancer education: the official journal of the American Association for Cancer Education.* 2011 Sep; 26(3):478–483. [PubMed: 21688089]
8. Gross RS, Fierman AH, Mendelsohn AL, Chiasson MA, Rosenberg TJ, Scheinmann R, et al. Maternal perceptions of infant hunger, satiety, and pressuring feeding styles in an urban Latino WIC population. *Academic Pediatrics.* 2010; 10:29–35. [PubMed: 20004633]
9. Hoerr SL, Hughes SO, Fisher JO, Nicklas TA, Liu Y, Shewchuk RM. Associations among parental feeding styles and children's food intake in families with limited incomes. *International Journal of Behavioral Nutrition and Physical Activity.* 2009; 6:55. [PubMed: 19678947]
10. 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.* 2006; 14:2026–2033. [PubMed: 17135620]
11. Thompson AL, Adair LS, Bentley ME. Pressuring and restrictive feeding styles influence infant feeding and size among a low-income African-American sample. *Obesity.* 2013; 21:562–571. [PubMed: 23592664]
12. 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; 36:201–210. [PubMed: 11358344]
13. Burdette HL, Whitaker RC, Hall WC, Daniels SR. Maternal infant-feeding style and children's adiposity at 5 years of age. *Arch Pediatr Adolesc Med.* 2006; 160:513–520. [PubMed: 16651495]
14. Sanders LM, Perrin EM, Yin HS, Bronaugh A, Rothman RL. on behalf of the Greenlight Study Team. "Greenlight Study": a controlled trial of low-literacy early childhood obesity prevention. *Pediatrics.* 2014; 133:e1724–e1737. [PubMed: 24819570]
15. Marín G, Sabogal F, VanOss Marín B, Otero-Sabogal F, Pérez-Stable EJ. Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences.* 1987; 9:183–205.
16. Thompson AL, Mendez MA, Borja JB, Adair LS, Zimmer CR, Bentley ME. Development and validation of the Infant Feeding Style Questionnaire. *Appetite.* 2009 Oct; 53(2):210–221. [PubMed: 19576254]
17. Toledo, L.; Perreira, K.; Stubbs, E.; Bentley, P. *Salud Infantil: Understanding and Promoting the Nutritional Health of Latino Infants.* Chapel Hill, NC: Carolina Population Center; 2009.
18. Harrell, F, Jr. *Regression Modeling Strategies.* New York: Springer-Verlag; 2001.
19. Kutner, MH.; Nachtsheim, CJ.; Neter, J. *Applied Linear Regression Models.* 4th Edition. Mcgraw-Hill Irwin; 2004.
20. Hughes SO, Power TG, Fisher JO, Mueller S, Nicklas TA. Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite.* 2005; 44:83–92. [PubMed: 15604035]

21. Farrow CV, Blissett J. Controlling feeding practices: cause or consequence of early child weight? *Pediatrics*. 2008; 121:e164–e169. [PubMed: 18166535]
22. Gross RS, Mendelsohn AL, Fierman AH, Messito MJ. Maternal controlling feeding styles during early infancy. *Clinical Pediatrics*. 2011; 50:1125–1133. [PubMed: 21757773]
23. Seth JG, Evans AE, Harris KK, Loyo JJ, Ray TC, Spaulding C, et al. Preschooler feeding practices and beliefs: differences among Spanish- and English-speaking WIC clients. *Fam Community Health*. 2007 Jul-Sep;30(3):257–270. [PubMed: 17563487]
24. Tovar A, Hennessy E, Pirie A, Must A, Gute DM, Hyatt RR, et al. Feeding styles and child weight status among recent immigrant mother-child dyads. *The international journal of behavioral nutrition and physical activity*. 2012; 9:62. [PubMed: 22642962]
25. Chapman DJ, Perez-Escamilla R. Acculturative type is associated with breastfeeding duration among low-income Latinas. *Matern Child Nutr*. 2013; 9:188–198. [PubMed: 21787375]
26. Harley K, Stamm NL, Eskenazi B. The effect of time in the U.S. on the duration of breastfeeding in women of Mexican descent. *Matern Child Health J*. 2007; 11:119–125. [PubMed: 17279324]
27. Gibson-Davis CM, Brooks-Gunn J. Couples' immigration status and ethnicity as determinants of breastfeeding. *Am J Public Health*. 2006; 96:641–646. [PubMed: 16507724]
28. Celi AC, Rich-Edwards JW, Richardson MK, Kleinman KP, Gillman MW. Immigration, race/ethnicity, and social and economic factors as predictors of breastfeeding initiation. *Arch Pediatr Adolesc Med*. 2005; 159:255–260. [PubMed: 15753269]
29. Singh GK, Kogan MD, Dee DL. Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the United States, 2003. *Pediatrics*. 2007; 119:S1, S38–S46.
30. Evans A, Seth JG, Smith S, Harris KK, Loyo J, Spaulding C, et al. Parental feeding practices and concerns related to child underweight, picky eating, and using food to calm differ according to ethnicity/race, acculturation, and income. *Matern Child Health J*. 2011; 15:899–909. [PubMed: 19771501]

**WHAT IS ALREADY KNOWN ABOUT THIS SUBJECT**

- Pediatric obesity is a significant public health issue with disproportionately high rates in the Latino population.
- Parental feeding styles can influence eating habits of children and may be related to future weight status.

**WHAT THIS STUDY ADDS**

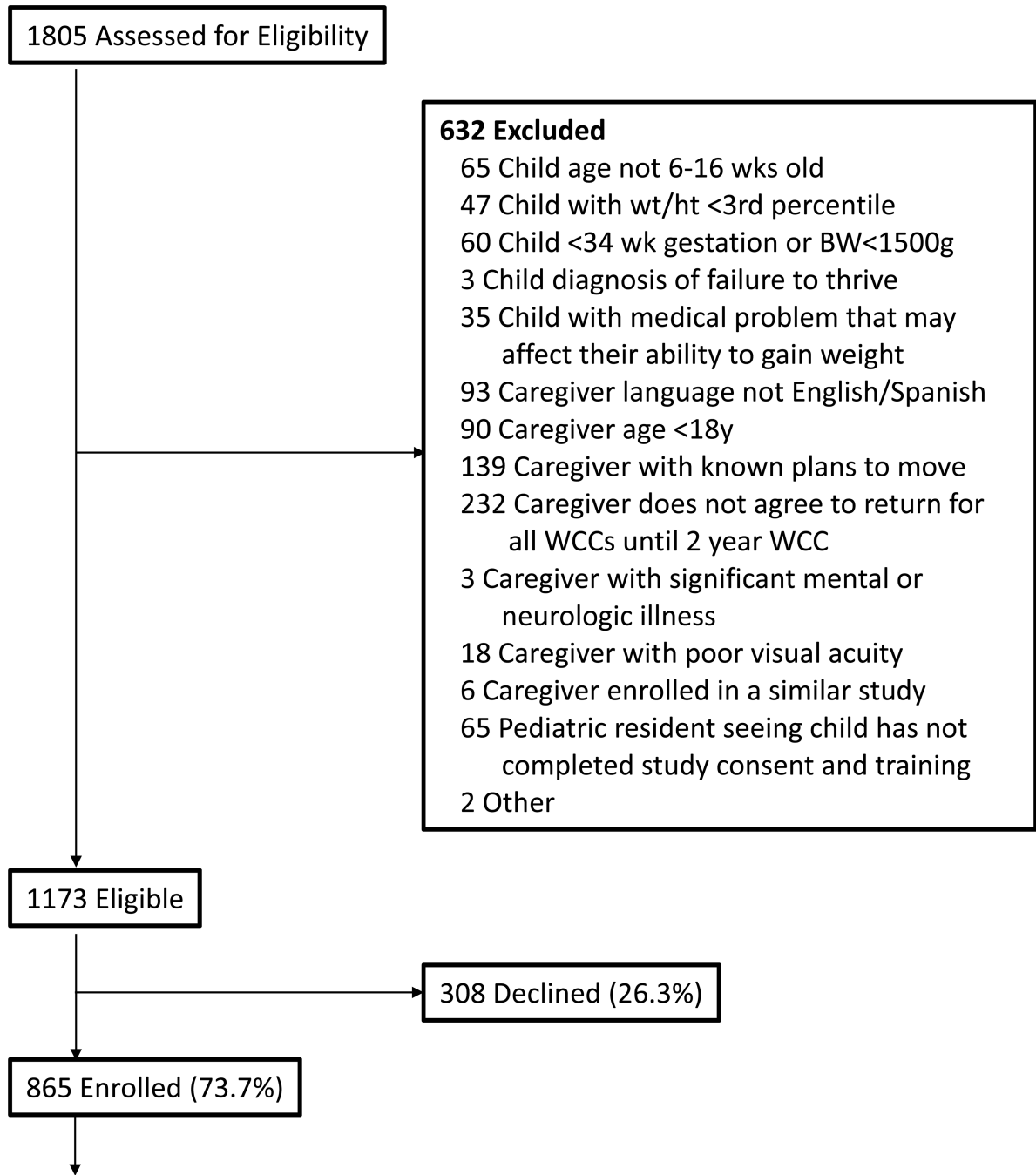
- Acculturation status is related to different feeding styles that have been associated with child obesity.
- Low acculturation is associated with more pressuring and laissez-faire feeding styles and less restriction with regards to diet quality.

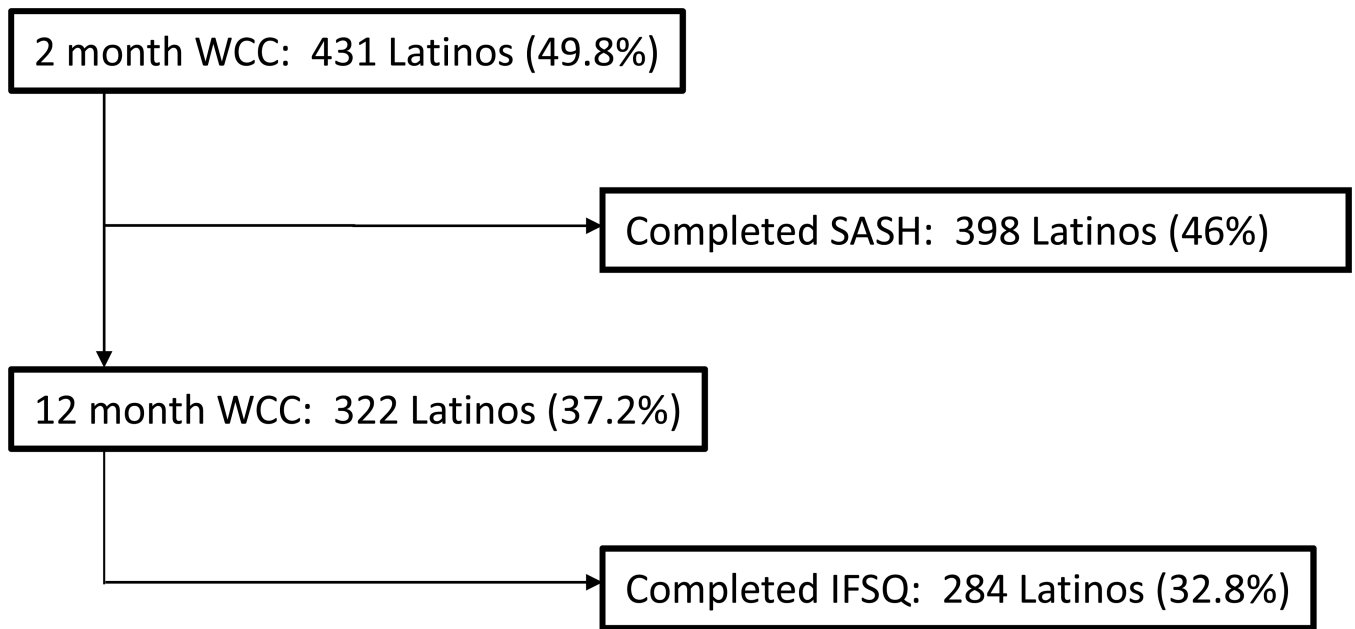
Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript





**FIGURE 1.**  
Study enrollment characteristics of those at the 12 month visit

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**TABLE 1**

IFSQ subdomains and sample items

<b>Subdomain</b>	<b>Sample item</b>
Laissez-Faire, attention	I think it is okay to prop an infant's bottle.
Laissez-Faire, diet quality	A toddler should be able to eat whatever he or she wants for snacks.
Pressuring to finish	I try to get (name of child) to finish his or her breastmilk or formula.
Pressuring with cereal	An infant less than 6 months old needs more than formula or breastmilk to be full.
Pressuring as soothing	The best way to make an infant stop crying is to feed him or her.
Restrictive, amount consumed	I carefully control how much (name of child) eats.
Restrictive, diet quality	A toddler should never eat fast food.
Responsive, satiety and hunger	I pay attention when (name of child) seems to be telling me that he or she is full or hungry.
Responsive, attention and interactions	I talk to (name of child) to encourage him or her to eat.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**TABLE 2**

Baseline characteristics of Latino sample

	N	Combined N = 398 (%)	SASH < 3 N = 328 (%)	SASH 3 N = 70 (%)	P-value
Patient's sex	431				0.221 <sup>1</sup>
Male		50.5	49.1	57.1	
Female		49.5	50.9	42.9	
Patient's age, mos [median (IQR)]	431	12.3 (12.1 – 12.8)	12.3 (12.1 – 12.7)	12.3 (12.1 – 12.8)	0.252 <sup>2</sup>
Patient weight, kg	314	9.8 (8.9 – 10.6)	9.6 (8.8 – 10.5)	10.1 (9.2 – 10.7)	0.084 <sup>2</sup>
Caregiver's sex	431				0.802 <sup>1</sup>
Male		3.8	3.7	4.3	
Female		96.2	96.3	95.7	
Caregiver's age, yrs [median (IQR)]	425	27.8 (23.7 – 32)	27.3 (23.8 – 32.3)	25.9 (22.4 – 30.6)	0.053 <sup>2</sup>
Patient's insurance	429				< 0.001 <sup>1</sup>
Medicaid		89.7	92.4	77.1	
Private		6.3	3.4	20	
None		4	4.3	2.9	
WIC status	428				< 0.001 <sup>1</sup>
No WIC		8.6	6.4	18.6	
WIC		91.4	93.6	81.4	
Income	415				< 0.001 <sup>1</sup>
< \$10,000		35.8	39.6	17.6	
\$10,000–19,999		32.6	34	26.5	
\$20,000–39,999		21.5	20.1	27.9	
\$40,000 or more		10.1	6.3	27.9	
Caregiver education	429				< 0.001 <sup>1</sup>

	N	Combined N = 398 (%)	SASH <3 N = 328 (%)	SASH 3 N = 70 (%)	P-value
Less than High school		41	45.1	21.4	
High school graduate		30.9	31.4	28.6	
Partial college		16.6	14.9	24.3	
College or higher		11.6	8.5	25.7	
Marital status	196				0.217 <sup>1</sup>
Single, never married		16.8	15.2	24.2	
Living with partner		33.7	35.1	27.3	
Married		44	45.7	36.4	
Separated		3.8	2.6	9.1	
Divorced		1.6	1.3	3	
Widowed		0	0	0	
Region of origin	429				
USA		17			
Mexico		46.4			
Central America		16.6			
South America		11.7			
Caribbean		7.5			
Other		0.5			
SASH1, [median (IQR)]	398	1.8 (1.4 – 2.7)	1.7 (1.3 – 2.1)	3.5 (3.2 – 4)	< 0.0001 <sup>2</sup>
Site	431				0.125 <sup>1</sup>
Miami		15.8	14	24.3	
UNC		20.9	22.3	14.3	
Vanderbilt		19.3	19.2	20	
NYU		44	44.5	41.4	

<sup>1</sup> Pearson Chi-square test;

<sup>2</sup> Wilcoxon test



**TABLE 3**

Unadjusted analyses for the association between SASH and IFSQ score at the 12 month well-child visit

<b>Outcome</b>	<b>Combined N = 284</b>	<b>SASH &lt; 3 N = 236</b>	<b>SASH = 3 N = 48</b>	<b>P-value*</b>
Laissez-Faire, attention	1.8 (1.2 – 2.2)	1.8 (1.4 – 2.2)	1.4 (1 – 1.9)	< 0.001
Laissez-Faire, diet quality	1.8 (1.5 – 2.3)	1.8 (1.5 – 2.5)	1.5 (1.2 – 2.3)	0.031
Pressuring to finish	2.5 (1.9 – 3)	2.5 (1.9 – 3.1)	2.2 (1.8 – 2.6)	0.029
Pressuring with cereal	1.8 (1.4 – 2.6)	2 (1.6 – 2.6)	1.4 (1 – 2.2)	< 0.001
Pressuring as soothing	1.8 (1.2 – 2.8)	1.8 (1.2 – 2.8)	1.5 (1 – 2.1)	0.019
Restrictive, amount consumed	4 (3 – 4.5)	4 (3 – 4.5)	3.9 (2.8 – 4.2)	0.18
Restrictive, diet quality	3.9 (3.3 – 4.4)	3.7 (3.2 – 4.3)	4.4 (3.5 – 5)	0.005
Responsive, satiety and hunger	4.3 (3.9 – 4.4)	4.1 (3.9 – 4.4)	4.4 (4.1 – 4.9)	0.002
Responsive, attention and interactions	4 (3.2 – 4.5)	4 (3.2 – 4.6)	4 (3 – 4.6)	0.792

Median (IQR);

\* Wilcoxon rank-sum test

**TABLE 4**

Adjusted analyses for the association between SASH and IFSQ score at the 12 month well-child visit

<b>Outcome</b>	<b>Adjusted OR (95% CI)</b>	<b>P-value*</b>
Laissez-Faire, attention	2.33 (1.06 – 5.13)	0.004
Laissez-Faire, diet quality	3.86 (1.7 – 8.75)	0.005
Pressuring to finish	1.22 (0.56 – 2.65)	0.5
Pressuring with cereal	1.69 (0.78 – 3.66)	0.115
Pressuring as soothing	3.62 (1.63 – 8.05)	0.007
Restrictive, amount consumed	0.79 (0.36 – 1.74)	0.565
Restrictive, diet quality	0.43 (0.19 – 0.94)	0.031
Responsive, satiety and hunger	0.54 (0.24 – 1.2)	0.065
Responsive, attention and interactions	0.89 (0.4 – 2.01)	0.96

\* Comparing SASH score of 1 to SASH score of 3