HHS Public Access

Author manuscript

*J Dev Behav Pediatr*. Author manuscript; available in PMC 2014 September 10.

Published in final edited form as:

*J Dev Behav Pediatr*. 2013 October ; 34(8): 541–548. doi:10.1097/DBP.0b013e3182a509fb.

# Obesity-Related Behaviors of US and Non-US Born Parents and Children in Low-income Households

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## Abstract

**Objective—**To examine differences in obesity-related behaviors by parental US born status among low-income, minority families participating in Healthy Habits, Happy Homes, an intervention trial to improve household routines for childhood obesity prevention. Evidence suggests lower obesity risk among adult immigrants, but research is inconclusive regarding the influence of having a non-US born parent on childhood obesity.

**Method—**We sampled 57 US born and 64 non-US born families of children ages 2–5.9 years living in the Boston area. At baseline, parents reported their own screen time, physical activity, diet, and sleep as well as their children's behaviors. We used linear and logistic regression to examine the association of parental US born status with obesity-related behaviors.

**Results—**Mean (SD) BMI z-score was 0.94 (1.16) and did not differ between groups. After adjusting for parental education and child race/ethnicity, children of non-US (v. US) born parents had later bedtimes (0.81 hours later; 95% CI: 0.37, 1.25) and wake-up times (0.56 hours later; 95% CI: 0.16, 0.95) and engaged in less active play (0.15 fewer hours/day; 95% CI: −0.28, −0.01). Non-US (v. US) born parents had less screen exposure.

**Conclusion—**In this cross-section of low-income, urban families, having a parent born outside the US was associated with a profile of risk and protective behavior; adjustment for education and race/ethnicity removed protective associations of parental nativity with child behavior. Obesity-related differences in behaviors and home environments should be considered when designing interventions targeting low-income communities with a high proportion of non-US born participants.

*Conflicts of Interest:* None of the authors have any conflicts of interest to disclose.

**Disclosure**

The authors declared no conflict of interest.

## INTRODUCTION

In 2009–2010, 17% of United States (US) children ages 2–19 years were obese, with greater odds of obesity among black and Hispanic children. Even as obesity rates appear to have plateaued in select US subgroups, rates have increased in countries such as Mexico that account for a high proportion of immigrants to the US. [1] The percentage of US children ages 0–17 years with at least one parent born outside the US grew from 15% in 1994 to 23% in 2011. [2] Though little is known about the influence of having a non-US born parent on obesity-related behaviors in childhood, [3, 4] designing appropriate interventions for these children will be key to addressing racial/ethnic disparities. To tailor messages and plan effective interventions, public health practitioners must understand how obesity-related behaviors and home environments differ by parental US born status.

Evidence suggests that immigrant adults have lower obesity risk despite lower income and educational attainment. [5] Varying hypotheses seek to explain this “immigrant paradox,” including a buffering effect of strong social networks and family ties, a healthy migrant effect, or reporting bias. Even if associations with birthplace represent true protective effects, there is conflicting evidence as to whether the children of immigrants benefit. Neighborhood level studies show lower rates of childhood obesity in communities with a high proportion of non-US born residents. [6] By contrast, data from the Early Childhood Longitudinal Study indicate that having a non-US born mother is not protective of childhood obesity [7] and may even be associated with elevated obesity risk. [8] Parents’ level of involvement in the ethnic culture of birth or the new culture of settlement can influence parenting behavior directly, through cultural beliefs about effective parenting techniques and what qualities parents should value in their children, and indirectly, through acculturative stress. [9–11] Parental US born status may interact with socioeconomic constraints, level of acculturation and race/ethnicity to influence behaviors from child feeding to mother-child interaction. Adjustment to a new culture takes time, but the rapid adoption of obesogenic dietary and lifestyle habits in immigrant households may combine with perceptions of heavy as healthy to elevate obesity risk in children. [12–14]

This study examined differences by parental US born status in obesity-related behaviors of 2 to 5.9 year old children participating in a randomized controlled trial in the greater Boston area. The behaviors of interest in this study were previously associated with US born status in adults: prior research has documented beneficial behaviors among immigrant families such as longer sleep duration, lower fast food consumption and fewer hours of television (TV) viewing, but also adverse behaviors including less physical activity. [3, 4, 15] We hypothesized that having a non-US born parent would be associated with a similar risk profile in children, e.g. longer sleep duration and greater frequency of meals eaten in the home, but fewer hours of active play.

## METHODS

Study subjects were parent-child dyads participating in the baseline assessment of the Healthy Habits, Happy Homes study, a randomized controlled trial to improve household routines to prevent obesity among children 2–5.9 years of age. [16] The study took place

from June, 2011 to August, 2012 and enrolled children who received their pediatric care at 4 federally-qualified community health centers in the greater Boston area. Parent-child dyads were considered eligible if: 1) at least one parent was > 18 years old; 2) the index child was 2 to 5.9 years old; 3) the child had a TV in the room where s/he sleeps; 4) the family was not planning to move from the Boston area within the study period; 5) the child did not have a medical condition requiring chronic care; and 6) at least one parent was comfortable responding to interviews and reading in English or Spanish. There were no BMI eligibility requirements for parents or children.

We telephoned parents to screen for eligibility, obtain verbal consent, collect contact information, and schedule a home visit. Staff collected all baseline data and obtained written consent at a scheduled home visit, which lasted between 40 minutes to 1 hour. If more than one adult headed the household, one adult primary caregiver agreed to be the study participant, respond to survey questions and be present at study home visits. During the home visit, staff measured the child's height and weight and used a home environment inventory to assess the number of rooms in the home and their use, the number and location of media devices in the home and distance to and safety of outdoor play spaces in the surrounding neighborhood. Staff also administered a baseline survey to the participating adult in either Spanish or English. All study activities were approved by the human subjects committee at Harvard Pilgrim Health Care. Further information on the study site, participant recruitment and eligibility criteria is available in the baseline paper from this trial. [16]

## Measures

Study staff administered the baseline survey to the participating parent during the home visit. Parents were asked about their place of birth, years of residence in the US, relationship to the participating child, household characteristics (e.g. annual income, highest level of education of any adult in the home, number of adults and children living in the home) and behaviors known to be associated with increased risk of childhood obesity (e.g. diet, family meals, screen time, physical activity and sleep behaviors). The participating adult respondent was defined as a US or non-US born parent according to the place of birth reported on the baseline survey. We chose parental US born status as a main exposure for comparability with prior studies and number of years living in the US as a secondary acculturation exposure among non-US born parents. [15, 17–19] Further information on the validity of the parent-report measurements used in the survey is available in the baseline paper from this trial. [16] Where formally validated measures were not available for the obesity-related behaviors of interest we selected parent-report questions used in prior studies that were correlated with objective measures or with obesity-related outcomes.

Parents reported the number of days at least some of the family ate a meal together in a typical week using questions previously associated with dietary intake and child BMI in other studies. [20–22] We also used questions previously associated with adult and adolescent BMI to ask about parent and child weekly fast food [23] and sugar-sweetened beverage consumption. [24] We measured children's indoor and outdoor physical activity time using questions correlated with accelerometer measurement of physical activity in preschool children. [25]

To measure sleep duration, we asked parents to quantify the average amount of daily sleep their child obtained including naps; importantly, caregiver report has been correlated with actigraph measurements of child sleep. [26–28] We also asked parents about the child's sleep routine using previously validated questions, including: how often the child slept alone (co-sleeping is associated with shorter sleep, more bedtime struggles, night waking and sleep problems); [29–34] typical bed and wake time on weekday and weekend days (bed and wake times have been associated with children's activity and weight status independent of sleep duration) [33]; and how often the child had a calming nighttime routine (these bedtime routine question is consistent with components assessed in the Bedtime Routines Questionnaire, a parent-report measure with adequate reliability and validity for research instruments). [29, 35]

To measure screen time exposure, we asked parents to report the total number of hours that they watched TV, video, or DVDs in a typical day, and the number of hours their child watched TV or videos, played video games, or used a computer (separately) on an average weekday and weekend day in the past month. Parental report of screen time exposure has been associated with child BMI and produced accurate estimates when compared with video-taped observation. [36, 37]

To obtain child BMI, we measured child height using a Schorr™ board and child weight using a calibrated electronic scale at the baseline visit. [38] We then calculated child BMI and BMI z-score using the CDC references. [39] We collected parent self-reported height, weight and pregnancy status, and we calculated parent BMI as $kg/m^2$.

### Statistical Methods

We used analysis of variance and non-parametric tests as necessary to test for differences in demographic characteristics among the households of US and non-US born parents. To assess associations of obesity-related behaviors with US born status we used linear and logistic regression and adjusted for parental educational attainment and child race/ethnicity. We also conducted sensitivity analyses adjusting for child BMI z-score. Secondary analyses adjusted for years of residence in the US among non-US born parents. We performed all analyses using SAS version 9.3 (SAS Institute, Cary, NC).

## RESULTS

Selected characteristics of parent-child dyads in the study sample are shown in Table 1. Over 90% of adult respondents were the participating child's biological mother; 6 fathers, 1 aunt and 1 grandparent also participated. Nearly 60% of the sample had annual household incomes at or below $20,000. The mean (SD) age of children was 4.0 (1.1) years, and mean (SD) BMI z-score was 0.94 (1.16). Neither age nor BMI z-score differed between groups. Children in the study were predominantly Hispanic (52%) or Black (34%); race/ethnicity differed between groups: children of non-US born parents were 69% Hispanic and 19% Black, while children of US born parents were 33% Hispanic and 51% Black. Nearly half of the non-US parents were from Central America; parents were also from other countries in Latin America, and a small number of parents were from South Asia and Africa. Children of non-US born parents were less likely to be enrolled in childcare (61% v. 83%). Overall, non-

US born households had lower educational attainment and a greater number of adult residents.

Table 2 shows the prevalence of obesity-related behaviors by US born status. Children of non-US (v. US) born parents drank more sugar-sweetened beverages (11.3 v. 5.9 servings/week), engaged in less active play (1.2 v. 1.4 hours/day), had later weekday bedtimes (9:23 v. 8:40p.m.) and wake-up times (7:42 v. 7:14 a.m.) and were less likely to have a consistent, calming nighttime routine (41% v. 65%). Both groups of children drank 100% juice an average of more than once per day, and there were no differences by US born status in the frequency of family meals, fast food consumption, child or parent sleep duration, co-sleeping, how consistently TVs were on in the home (e.g. during meals or when no one was watching), nor whether the parent put limits on TV-viewing. We found no differences in access to outdoor play space or in the proximity and safety of nearby parks by US born status.

Table 3 shows bivariate and adjusted associations of non-US born status and obesity-related behaviors. After adjustment for parental educational attainment, children of non-US (v. US) born parents consumed more soda (0.67 additional servings/week; 95% CI: 0.02, 1.32) and total sugar-sweetened beverages (4.42 additional servings/week; 95% CI: 0.35, 8.49), and engaged in less active play (0.16 fewer hours/day; 95% CI: −0.29, −0.03). Children of non-US born parents watched 44 fewer minutes of TV daily than children of US born parents (0.74 fewer hours/day; 95% CI: −1.35, −0.14) after adjusting for parental educational attainment. Children of non-US born parents also had later weekday bedtimes (0.75 hours later; 95% CI: 0.32, 1.17) and wake-up times (0.51 hours later; 95% CI: 0.13, 0.89) after adjusting for parental educational attainment.

As shown in Table 3, further adjustment for child race/ethnicity removed the protective association of non-US born status with child TV-viewing, but strengthened associations with lower odds of a calming nighttime routine and later weekday bed and wake times. Adjustment for child race/ethnicity did not substantially affect the association of non-US born status lower child active play and higher child soda consumption. Additional adjustment for child BMI z-score did not substantially change any results (data not shown).

Among the adults, in education-adjusted models non-US (v. US) born parents drank fewer sugar-sweetened beverages (5.30 fewer servings/week; 95% CI: −9.10, −1.50); were exposed to fewer total hours of screen time (1.41 fewer hours/day; 95% CI: −2.17, −0.66); and were less likely to eat out one or more times per week (OR = 0.29; 95% CI: 0.08, 0.998). Parent fast food consumption, sleep duration and physical activity did not differ by US born status. Further adjustment for race/ethnicity removed the protective association of non-US born status with parent sugar-sweetened beverage intake and frequency of eating out, but associations with lower screen time remained.

The prevalence of co-sleeping (sharing a bed or bedroom with a parent) did not differ between children of US born parents and non-US born parents (14% v. 30% prevalence of co-sleepers); however, children that did co-sleep were less likely to sleep the recommended ≤ 11 hours per day (OR = 0.46; 95% CI: 0.22, 0.97; data not shown).

Within the non-US born group, number of years spent in the US did not predict parent or child screen time, sleep, or physical activity, but longer parental residence in the US was associated with somewhat higher child fast food consumption (0.04 meals/week; 95% CI: 0.02, 0.07) and parent sugar-sweetened beverage consumption (0.06 servings/day; 95% CI: 0.01, 0.10), even after adjusting for educational attainment.

## DISCUSSION

In this study of low-income, urban, racial/ethnic minority families, we hypothesized that having a non-US born parent would be associated with a profile of both adverse and protective obesity-related behavior in children; however, in models adjusted for both education and race/ethnicity we observed only adverse associations. In initial models adjusted for education only, children of non-US born parents watched fewer hours of TV but consumed more sugar-sweetened beverages and engaged in less active play. We also found several obesity-protective behaviors among the adults when adjusting for education only: non-US (v. US) born parents had less screen time exposure and ate fewer meals outside the home, and, in contrast to their children, consumed fewer sugar-sweetened beverages. However, the influence of non-US born status on certain obesogenic behaviors appeared to vary by race/ethnicity: adjustment for child race/ethnicity removed protective association of parental non-US born status with child TV-viewing, parent sugar-sweetened beverage intake and frequency of eating out, but strengthened associations with lower odds of a calming nighttime routine and later weekday bed and wake times, implying that both nativity and race/ethnicity should be consider when designing intervention messages. Tenure in the US had a small impact on parent and child behaviors: among non-US born parents, the number of years living in the US was associated with modestly higher child fast food consumption and parental sugar-sweetened beverage intake.

Consistent with previous studies of low-income and racial/ethnic minority preschool children, consumption of 100% juice and sugar-sweetened beverages was common for all participants. [40, 41] We found soda consumption to be more prevalent among children of non-US (v. US) born parents. Prior studies have found soda to be more available in Hispanic households, and hypothesized that other forms of sugar-sweetened beverages, such as fruit drinks, might be more common amongst African Americans. [42] Sugar-sweetened beverage consumption is an important intervention focus for low-income families in general, and for children of immigrants in particular. [43] Intervention messages should include attention to culturally-specific sugar-sweetened beverages, including aguas frescas, fruit drinks and flavored milk. A potential reason for the higher prevalence of soda intake among children of immigrants could be differing perceptions of children’s risk of obesity; studies of Latina mothers suggest that perceptions of chubby children as healthy or that children’s excess weight will resolve with growth are more common amongst immigrant v. US born mothers. [12, 13]

We also found that children of non-US born parents engaged in less active play. In contrast to this finding, a study using data from the National Survey of Children's Health documented greater physical activity among immigrant children; this same study found also lower TV-viewing among immigrant children, as was observed in our sample when

adjusting for education only. [44] It is possible some of the differences in physical activity between children of US and non-US born parents could be accounted for by unmeasured factors such as neighborhood characteristics. However, all of our study participants lived in the same set of neighborhoods in the Boston area, and we found no differences in access to outdoor play space or in the proximity and safety of nearby parks by US born status.

To our knowledge, our study is the first to examine sleep routines among children of non-US born parents. Child sleep duration did not differ by US born status. However, we observed later bed and wake times and lower odds of a calming nighttime routine among children of non-US born parents. Bedtime may represent an important intervention focus: later bedtimes are associated with shorter sleep duration in preschool children. [30] As the children of non-US born parents enter school, late bedtimes could result in insufficient sleep since the late weekday wakeup times will no longer be possible. Several important contextual factors could account for late bedtimes: first, one third of non-US born parents reported sharing a bed or bedroom with their child. Second, later bedtimes, co-sleeping and lack of a calming routine may be due to space constraints because of the greater numbers of adults in the homes of non-US born parents. The prevalence of co-sleeping did not differ significantly by US born status; however, co-sleeping children were less likely to sleep the recommended ≤11 hours. Considering these aspects of the home environment (co-sleeping and number of adults) will ensure that interventions targeting sleep and bedtime routines develop strategies compatible with the realities of the immigrant families' living situations.

Consistent with other studies that have found foreign birthplace to be protective with respect to dietary patterns, [45] we found less frequent eating out and lower sugar-sweetened beverages among non-US born parents in education-adjusted models; however, further adjustment for race/ethnicity removed protective associations. We did not find differences in parent fast food consumption or frequency of family meals, though foreign birthplace has been protective in other studies. [46] Non-US born parents were also exposed to an hour less of screen time daily than non-US born parents; this could be due in part to employment status: unemployed parents were exposed to more hours of screen time than parents who worked or studied part or full time, and a greater proportion of unemployed parents were born in the US in this sample.

A systematic review examining children's diets showed no definitive associations with parental acculturation; [47] however, in this study, we found the number of years living in the US was associated with modest increases in parent sugar-sweetened beverage intake among non-US born parents as well as in the fast food consumption of their children.

## Strengths and limitations

Our study had several strengths and limitations. Few studies have had the opportunity to address differences in the home environments and obesity-related behaviors of children from immigrant families in a sample of mostly black and Hispanic low income urban children. No study that we know of has assessed differences in child sleep routines by parental US born status. Given the growing proportion of children with at least one parent born outside the US, these findings can be used to strengthen childhood obesity interventions.

While we measured child height and weight objectively, parent height and weight and many of our behavioral measures were from parental report; where validated measures were not available for the obesity-related behaviors of interest we selected parent-report measures previously correlated with objective measures or with obesity-related outcomes, but it is possible that reporting bias differed by US born status. While we controlled for educational attainment and race/ethnicity in our analyses, there may still be confounding by other factors (e.g. specific country of birth). Due to insufficient sample size we were not able to conduct analyses by country of origin or racial/ethnic subgroup, and acculturation measures were limited to nativity and years spent in the US: a subgroup analysis could have provided a more nuanced description of the differing roles of race/ethnicity, culture and nativity in obesity-related behaviors. Our results may not be generalizable to more socio-economically advantaged populations since this sample was 86% black and Hispanic and the income levels of all families in this study were relatively low. However, our study population is a key obesity health disparities group given the socioeconomic and racial disparities in childhood obesity. We believe these results can be useful in developing appropriate intervention messages for low-income communities.

### Conclusions

Tailoring interventions to non-US born families could help reduce obesity-related disparities: behavioral goals are similar, but the efficacy of messages and techniques may vary by nativity and race/ethnicity. For example, engaging multiple caregivers to change household routines might be particularly relevant in immigrant households where we observed lower childcare enrollment and greater number of adults. Further, the protective behaviors found in non-US parents (e.g. less frequent eating out, screen time and sugar-sweetened beverages) could be reinforced and leveraged to modify the obesity-related behaviors of their children. [48] In conclusion, our findings suggest that the design of interventions to prevent childhood obesity in low-income communities should consider that the prevalence of different obesity-related behaviors, household routines and features of the home environment may differ for immigrant families.

## Acknowledgments

The authors would like to thank the participants and research staff of the Healthy Habits, Happy Homes study. Additionally, the authors would like to thank Bettylou Sherry and Jan Jernigan of the CDC for her ongoing contribution to the development of the Healthy Habits, Happy Homes program materials and intervention structure.

**Funding:** This work was supported by the Centers for Disease Control and Prevention's National Center for Chronic Disease Prevention and Health Promotion (Prevention Research Centers Grants, 1U48DP00194). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## References

1. Ogden CL, et al. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999–2010. JAMA. 2012; 307(5):483–90. [PubMed: 22253364]
2. Federal interagency forum on child and family statistics. America's Children in Brief: Key National Indicators of Well-Being; Family and Social Environment. 2012. [cited 2012 July 30]; Available from: http://www.childstats.gov/americaschildren/famsoc.asp

3. Gordon-Larsen P, et al. Acculturation and overweight-related behaviors among Hispanic immigrants to the US: the National Longitudinal Study of Adolescent Health. Soc Sci Med. 2003; 57(11):2023–34. [PubMed: 14512234]
4. Singh GK, Kogan MD, Yu SM. Disparities in obesity and overweight prevalence among US immigrant children and adolescents by generational status. J Community Health. 2009; 34(4):271–81. [PubMed: 19333745]
5. Akresh IR. Overweight and obesity among foreign-born and U.S.-born Hispanics. Biodemography Soc Biol. 2008; 54(2):183–99. [PubMed: 19350754]
6. Kimbro RT, Denney JT. Neighborhood context and racial/ethnic differences in young children's obesity: Structural barriers to interventions. Soc Sci Med. 2012
7. Li N, et al. Is there a healthy foreign born effect for childhood obesity in the United States? Matern Child Health J. 2010; 15(3):310–23. [PubMed: 20229329]
8. Van Hook J, Baker E. Big boys and little girls: gender, acculturation, and weight among young children of immigrants. J Health Soc Behav. 2010; 51(2):200–14. [PubMed: 20617759]
9. Costigan CL, Koryzma CM. Acculturation and adjustment among immigrant Chinese parents: mediating role of parenting efficacy. J Couns Psychol. 2010; 58(2):183–96. [PubMed: 21142354]
10. Kim SY, et al. Parent-child acculturation, parenting, and adolescent depressive symptoms in Chinese immigrant families. J Fam Psychol. 2009; 23(3):426–37. [PubMed: 19586205]
11. Tovar A, et al. Feeding styles and child weight status among recent immigrant mother-child dyads. Int J Behav Nutr Phys Act. 2012; 9:62. [PubMed: 22642962]
12. Lindsay AC, et al. Latina mothers' beliefs and practices related to weight status, feeding, and the development of child overweight. Public Health Nurs. 2011; 28(2):107–18. [PubMed: 21442018]
13. Rosas LG, et al. Maternal perception of child weight among Mexicans in California and Mexico. Matern Child Health J. 2009; 14(6):886–94. [PubMed: 19911262]
14. Williams JE, et al. Commentary: A social-ecological perspective on obesity among Latinos. Ethn Dis. 2012; 21(4):467–72. [PubMed: 22428352]
15. Sharkey JR, Johnson CM, Dean WR. Nativity is associated with sugar-sweetened beverage and fast-food meal consumption among Mexican-origin women in Texas border colonias. Nutr J. 2011; 10:101. [PubMed: 21962014]
16. Taveras EM, et al. Healthy Habits, Happy Homes: Methods and baseline data of a randomized controlled trial to improve household routines for obesity prevention. Prev Med. 2012; 55(5):418–26. [PubMed: 22960162]
17. Barcenas CH, et al. Birthplace, years of residence in the United States, and obesity among Mexican-American adults. Obesity (Silver Spring). 2007; 15(4):1043–52. [PubMed: 17426341]
18. Barroso CS, et al. The association between early childhood overweight and maternal factors. Child Obes. 2012; 8(5):449–54. [PubMed: 23181894]
19. Bennett GG, et al. Immigration and obesity among lower income blacks. Obesity (Silver Spring). 2007; 15(6):1391–4. [PubMed: 17557975]
20. Fulkerson JA, et al. Family dinner meal frequency and adolescent development: relationships with developmental assets and high-risk behaviors. J Adolesc Health. 2006; 39(3):337–45. [PubMed: 16919794]
21. Taveras EM, et al. Family dinner and adolescent overweight. Obes Res. 2005; 13(5):900–6. [PubMed: 15919844]
22. Anderson SE, Whitaker RC. Household routines and obesity in US preschool-aged children. Pediatrics. 2010; 125(3):420–8. [PubMed: 20142280]
23. Taveras EM, et al. Association of Consumption of Fried Food Away From Home With Body Mass Index and Diet Quality in Older Children and Adolescents. Pediatrics. 2005; 116(4):e518–524. [PubMed: 16199680]
24. Greenwood JL, et al. Creating a clinical screening questionnaire for eating behaviors associated with overweight and obesity. J Am Board Fam Med. 2008; 21(6):539–48. [PubMed: 18988721]
25. Burdette HL, Whitaker RC, Daniels SR. Parental report of outdoor playtime as a measure of physical activity in preschool-aged children. Arch Pediatr Adolesc Med. 2004; 158(4):353–357. [PubMed: 15066875]

26. Bell JF, Zimmerman FJ. Shortened nighttime sleep duration in early life and subsequent childhood obesity. Arch Pediatr Adolesc Med. 2010; 164(9):840–5. [PubMed: 20819966]
27. Lumeng JC, et al. Shorter sleep duration is associated with increased risk for being overweight at ages 9 to 12 years. Pediatrics. 2007; 120(5):1020–9. [PubMed: 17974739]
28. Taveras EM, et al. Short sleep duration in infancy and risk of childhood overweight. Arch Pediatr Adolesc Med. 2008; 162(4):305–11. [PubMed: 18391138]
29. Hale L, et al. Social and demographic predictors of preschoolers' bedtime routines. J Dev Behav Pediatr. 2009; 30(5):394–402. [PubMed: 19745760]
30. Jiang F, et al. Sleep and obesity in preschool children. J Pediatr. 2009; 154(6):814–8. [PubMed: 19243786]
31. Latz S, Wolf AW, Lozoff B. Cosleeping in context: sleep practices and problems in young children in Japan and the United States. Arch Pediatr Adolesc Med. 1999; 153(4):339–46. [PubMed: 10201715]
32. Lozoff B, Wolf AW, Davis NS. Cosleeping in urban families with young children in the United States. Pediatrics. 1984; 74(2):171–82. [PubMed: 6462817]
33. Olds TS, Maher CA, Matricciani L. Sleep duration or bedtime? Exploring the relationship between sleep habits and weight status and activity patterns. Sleep. 2011; 34(10):1299–307. [PubMed: 21966061]
34. Sadeh A. A brief screening questionnaire for infant sleep problems: validation and findings for an Internet sample. Pediatrics. 2004; 113(6):e570–7. [PubMed: 15173539]
35. Henderson JA, Jordan SS. Development and preliminary evaluation of the Bedtime Routines Questionnaire. Journal of Psychopathology and Behavioral Assessment. Journal of Psychopathology and Behavioral Assessment. 2010; 32(2):271–280.
36. Anderson DR, et al. Estimates of young children's time with television: a methodological comparison of parent reports with time-lapse video home observation. Child Dev. 1985; 56(5): 1345–57. [PubMed: 4053746]
37. Robinson TN. Reducing children's television viewing to prevent obesity: a randomized controlled trial. JAMA. 1999; 282(16):1561–7. [PubMed: 10546696]
38. Centers for Disease Control and Prevention. Growth Chart Training. 2012
39. Kuczmarski RJ, et al. 2000 CDC Growth Charts for the United States: methods and development. Vital Health Stat. 2002; 11(246):1–190.
40. Erinosho TO, et al. Dietary Intakes of Preschool-Aged Children in Relation to Caregivers' Race/ Ethnicity, Acculturation, and Demographic Characteristics: Results from the 2007 California Health Interview Survey. Matern Child Health J. 2011
41. O'Connor TM, Yang SJ, Nicklas TA. Beverage intake among preschool children and its effect on weight status. Pediatrics. 2006; 118(4):e1010–8. [PubMed: 17015497]
42. Skala K, et al. Ethnic Differences in the Home Food Environment and Parental Food Practices Among Families of Low-Income Hispanic and African-American Preschoolers. J Immigr Minor Health. 2011
43. Hamasha AA, et al. Oral health behaviors of children in low and high socioeconomic status families. Pediatr Dent. 2006; 28(4):310–5. [PubMed: 16903438]
44. Singh GK, et al. High levels of physical inactivity and sedentary behaviors among US immigrant children and adolescents. Arch Pediatr Adolesc Med. 2008; 162(8):756–63. [PubMed: 18678808]
45. Duffey KJ, et al. Birthplace is associated with more adverse dietary profiles for US-born than for foreign-born Latino adults. J Nutr. 2008; 138(12):2428–35. [PubMed: 19022968]
46. Bauer KW, et al. Adolescent girls' weight-related family environments, Minnesota. Prev Chronic Dis. 2011; 8(3):A68. [PubMed: 21477508]
47. Arredondo EM, et al. Is parenting style related to children's healthy eating and physical activity in Latino families? Health Educ Res. 2006; 21(6):862–71. [PubMed: 17032706]
48. Sonneville KR, et al. Associations of obesogenic behaviors in mothers and obese children participating in a randomized trial. Obesity (Silver Spring). 2012; 20(7):1449–54. [PubMed: 22349735]

## Table 1

Baseline Characteristics of 121 Parent-Child Pairs in the Healthy Habits, Happy Homes Intervention.

| | US Born Parent | Non-US Born Parent |
|---|---|---|
| | ***n (%)*** | ***n (%)*** |
| Full sample | 57 (47) | 64 (53) |
| **Child characteristics** | | |
| | *n (%)* | *n (%)* |
| Sex (% female) | 28 (49.1) | 36 (56.3) |
| Race/ethnicity (%) | | |
| Black | 29 (50.9) | 12 (18.8) |
| Hispanic | 19 (33.3) | 44 (68.8) * |
| Other | 9 (15.8) | 8 (12.5) |
| Childcare (% enrolled) | 47 (82.5) | 39 (60.9) * |
| | *Mean (SD)* | *Mean (SD)* |
| Age, months | 48.5 (12.4) | 47.1 (13.9) |
| Body mass index | 17.2 (2.6) | 17.5 (2.2) * |
| Body mass index z-score | 0.9 (1.1) | 1.0 (1.2) |
| Childcare (hours/week) | 33.8 (9.62) | 28.7 (11.2) |
| **Parent characteristics** | | |
| | *n (%)* | *n (%)* |
| Age, years | 31.9 (8.4) | 32.2 (6.8) |
| Body mass index | 28.7 (7.4) | 27.1 (4.8) |
| Relationship to child | *Mean (SD)* | *Mean (SD)* |
| Mother | 53 (93.0) | 57 (89.7) |
| Father | 1 (1.75) | 5 (7.8) |
| Other | 3 (5.3) | 2 (3.1) |
| **Household characteristics** | | |
| | *n (%)* | *n (%)* |
| Household income (%< $50k/year) | 44 (86.3) | 47 (92.2) |
| Household highest degree | | * |
| Less than high school | 3 (5.4) | 17 (27.4) |
| High school graduate | 17 (30.4) | 23 (37.1) |
| Some college or more | 36 (64.3) | 22 (35.5) |
| | *Mean (SD)* | *Mean (SD)* |
| Total adults in home | 1.7 (0.9) | 2.8 (1.2) * |
| Total children in home | 1.9 (0.9) | 1.9 (0.8) |

* indicates $p<0.05$

## Table 2

Prevalence of Obesity-Related Behaviors and Routines by Parental US Born Status.

| | US Born Parent | Non-US Born Parent |
|---|---|---|
| **Child behaviors** | | |
| | ***Mean (SD)*** | ***Mean (SD)*** |
| Total screen time (hours/day) | 4.2 (2.7) | 3.5 (2.5) |
| TV time (hours /day) | 2.8 (1.7) | 2.3 (1.5) |
| Active play (hours /day) | 1.4 (0.3) | 1.2 (0.4) * |
| Sugar-sweetened beverages (beverages/week) | 5.9 (7.7) | 11.3 (12.3) * |
| Soda (beverages/week) | 0.5 (1.1) | 1.1 (2.0) * |
| Flavored milk (beverages/week) | 3.1 (6.4) | 5.7 (7.6) * |
| 100% Juice (beverages/week) | 8.2 (7.8) | 8.5 (8.0) |
| Fast food (meals/week) | 0.8 (0.9) | 0.7 (0.7) |
| Sleep duration (hours/day) | 10.6 (0.9) | 10.5 (1.0) |
| Weekday bedtime (time, p.m.) | 8:40 (0.8) | 9:23 (1.3) * |
| Weekday wake time (time, a.m.) | 7:14 (0.8) | 7:42 (1.1) * |
| | *n (%)* | *n (%)* |
| Family meals 7 or more times/week (%) | 34 (60.0) | 44 (69.0) |
| Never sleeps alone (%) | 8 (14.0) | 19 (30.0) |
| Often/always has a calming bedtime routine (%) | 37 ( 65.0) | 26 (41.0) * |
| **Parent behaviors** | | |
| | *Mean (SD)* | *Mean (SD)* |
| Total screen time (hours/day) | 3.5 (2.4) | 2.1 (1.3) * |
| Physical activity (hours/week) | 8.5 (11.6) | 6.1 (8.8) |
| Sugar-sweetened beverages (beverages/week) | 9.1 (11.9) | 5.6 (8.2) |
| Fast food (meals/week) | 1.2 (1.1) | 1 (1.5) |
| Sleep duration (hours/day) | 7.3 (2.1) | 7.4 (1.7) |
| | *n (%)* | *n (%)* |
| Eat out at least once/week (%) | 53 (93.0) | 52 (81.0) |

* indicates $p<0.05$

## Table 3

Associations of Obesity-Related Behaviors and Routines with Parental US Born Status.

| | Non-US v. US Born Parent | | |
|---|---|---|---|
| | β (95% Confidence Interval) | | |
| **Child behaviors** | *Crude* | *Education-adjusted* | *Race + Education-adjusted* |
| Total screen time (hours/day) | −0.75 (−1.71, 0.20) | −0.79 (−1.83, 0.26) | −0.48 (−1.1.56, 0.60) |
| TV time (hours/day) | −0.50 (−1.07, 0.07) | −0.74 (−1.35, −0.14)* | −0.59 (−1.22, 0.04) |
| Active play (hours/day) | −0.13 (−0.25, 0.00) | −0.16 (−0.29, −0.03)* | −0.15 (−0.28, −0.01)* |
| Sugar-sweetened beverages (beverages/week) | 5.31 (1.56, 9.06)* | 4.42 (0.35, 8.49)* | 3.75 (−0.48, 7.98) |
| Soda (beverages/week) | 0.65 (0.06, 1.25)* | 0.67 (0.02, 1.32) * | 0.69 (0.001, 1.37)* |
| Flavored milk (beverages/week) | 2.60 (0.06, 5.13)* | 2.59 (−0.18, 5.36) | 2.01 (−0.87, 4.90) |
| 100% Juice (beverages/week) | 0.31 (−2.53, 3.15) | 0.37 (−2.71, 3.45) | 0.47 (−2.73, 3.66) |
| Fast food (meals/week) | −0.14 (−0.42, 0.13) | −0.12 (−0.43, 0.19) | −0.05 (−0.37, 0.26) |
| Sleep duration (hours/day) | −0.12 (−0.48, 0.24) | −0.12 (−0.50, 0.27) | −0.12 (−0.53, 0.28) |
| Weekday bedtime (time, p.m.) | 0.73 (0.34, 1.12)* | 0.75 (0.32, 1.17)* | 0.81 (0.37, 1.25)* |
| Weekday wake time (time, a.m.) | 0.49 (0.14, 0.84)* | 0.51 (0.13, 0.89)* | 0.56 (0.16, 0.95)* |
| | **Odds Ratio (95% Confidence Interval)** | | |
| | *Crude* | *Education-adjusted* | *Race + Education-adjusted* |
| Family meals 7 or more times/week (yes/no) | 1.46 (0.69, 3.11) | 1.30 (0.59, 2.90) | 1.23 (0.54, 2.81) |
| Never sleeps alone (yes/no) | 1.87 (0.91, 3.85)* | 1.40 (0.65, 3.05) | 1.35 (0.60, 3.04) |
| Often/always calming bedtime routine (yes/no) | 0.37 (0.18, 0.77)* | 0.52 (0.23, 1.18) | 0.38 (0.16, 0.94)* |
| **Parent behaviors** | **β (95% Confidence Interval)** | | |
| | *Crude* | *Education-adjusted* | *Race + Education-adjusted* |
| Total screen time (hours/day) | −1.39 (−2.09, −0.69)* | −1.41 (−2.17, −0.66)* | −1.12 (−1.89, −0.36)* |
| Physical activity (hours/week) | −2.41 (−8.09, 3.27) | −2.50 (−8.06, 3.95) | −2.37 (−8.54, 3.79) |
| Sugar-sweetened beverages (beverages/week) | −3.20 (−6.84, 0.45)* | −5.30 (−9.10, −1.50)* | 0.06 (0.01, 0.11)* |
| Fast food (meals/week) | −0.16 (−0.65, 0.33) | −0.05 (−0.58, 0.48) | 0.02 (−0.53, 0.57) |
| Sleep duration (hours/day) | 0.10 (−0.58, 0.77) | 0.04 (−0.70, 0.78) | 0.15 (−0.62, 0.92) |
| | **Odds Ratio (95% Confidence Interval)** | | |
| | *Crude* | *Education-adjusted* | *Race + Education-adjusted* |
| Eat out at least once/week (yes/no) | 0.33 (0.10, 1.08) | 0.29 (0.08, 0.998)* | 0.30 (0.08, 1.09) |

* indicates $p<0.05$