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Correlates of Overweight and Obesity Among American Indian/ Alaska Native and Non-Hispanic White Children and Adolescents: National Survey of Children’s Health, 2007

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Abstract

Risk factors for overweight and obesity may be different for American Indian and Alaska Native (AI/AN) children compared to children of other racial/ethnic backgrounds, as obesity prevalence among AI/AN children remains much higher. Using data from the 2007 National Survey of Children’s Health, behavioral (child’s sport team participation, vigorous physical activity, television viewing, and computer use), household (parental physical activity, frequency of family meals, rules limiting television viewing, and television in the child’s bedroom), neighborhood (neighborhood support, perceived community and school safety, and presence of parks, sidewalks, and recreation centers in the neighborhood), and sociodemographic (child’s age and sex, household structure, and poverty status) correlates of overweight/obesity (body mass index \geq 85th percentile for age and sex) were assessed among 10–17 year-old non-Hispanic white (NHW) and AI/AN children residing in Alaska, Arizona, Montana, New Mexico, North Dakota, Oklahoma, and South Dakota ($n = 5,372$). Prevalence of overweight/obesity was 29.0 % among NHW children and 48.3 % among AI/AN children in this sample. Viewing more than 2 h of television per day (adjusted odds ratio [aOR] = 2.0; 95 % confidence interval [CI] = 1.5–2.8), a lack of neighborhood support (aOR = 1.9; 95 % CI = 1.1–3.5), and demographic characteristics were significantly associated with overweight/obesity in the pooled sample. Lack of sport team participation was significantly associated with overweight/obesity only among AI/AN children

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(aOR = 2.7; 95 % CI = 1.3–5.2). Culturally sensitive interventions targeting individual predictors, such as sports team participation and television viewing, in conjunction with neighborhood-level factors, may be effective in addressing childhood overweight/obesity among AI/AN children. Longitudinal studies are needed to confirm these findings.

Keywords

American Indian/Alaska Native; Health disparities; Obesity; Adolescent health; Adolescent physical activity

Introduction

Over the last few decades in the United States, the prevalence of overweight and obesity among children has increased at an alarming rate. The prevalence of overweight in children was below 10 % in 1971 [1], but by 2008, had increased to more than 30 %, with the prevalence of obesity in children above 15 % [2]. This alarming increase indicates that childhood overweight and obesity in the US have not been effectively prevented or managed.

The development of overweight and obesity in childhood is a complex process, with many interrelated contributing factors. One reported factor is socioeconomic status (SES) [3]. Low SES is known to be associated with a wide array of factors that can have an effect on weight status, including limited access to a high nutrition and low calorie diet [4] and environmental conditions that do not provide sufficient and safe opportunities for exercise [5]. High levels of sedentary behaviors, such as watching television or playing video games, also contribute to childhood overweight [6–8]. The family environment also has a strong effect on a child's risk of overweight and obesity. For example, having an overweight or obese parent is a strong predictor of child overweight or obesity, regardless of SES [9]. Studies have suggested that this association is a product of both genetic [10] and sociocultural determinants, such as levels of physical activity as determined by lifestyle, and nutritional values [11]. Not all aspects of the family environment are conclusive predictors of obesity; the frequency of families eating meals together has been shown to have differing effects by racial/ethnic groups [12].

There are racial and ethnic disparities in childhood overweight and obesity attributed to differential rates of exposure to risk factors [13]. The prevalence of overweight (23 %) and obesity (24 %) among American Indian/Alaska Native (AI/AN) children have been shown to be the highest of any racial/ethnic group in the country [14–16], and are considered to be among the most serious health problems facing AI/AN children [17]. The consequences of these high levels of overweight and obesity are significant, with one study finding that AI/AN adults who were obese as children had a mortality rate more than twice that of those adults who were not obese as children [18].

Interventions to address childhood overweight and obesity are usually developed by targeting known risk factors [19]. However, many prevention and treatment interventions have not been effective among AI/AN children [20, 21]. This may be because the risk

factors for overweight and obesity among AI/AN children are different than those among other racial/ethnic groups, or it may be that interventions have not been as effectively implemented in or appropriately tailored to the AI/AN population. The purpose of our analysis is to increase the understanding of risk factors for childhood overweight and obesity among AI/AN communities, which can then be used to develop effective prevention and treatment strategies.

Methods

Data Source and Sample

The National Survey of Children's Health is a population-based, cross-sectional survey of households with children aged 0–17 years. The survey is conducted by telephone in English and Spanish, using random digit dialing to identify households with one or more children aged <18 years. Among households with multiple children, one child is chosen at random to be the index child for the survey. This method of sampling is based on the State and Local Area Integrated Telephone Survey (SLAITS). In 2007, a total of 91,642 surveys were completed nationally [22]. Survey results are weighted to represent the population of non-institutionalized children both nationally and within each state. The overall response rate of the 2007 National Survey of Children's Health was 46.7 %.

Our analysis was limited to non-Hispanic (NH) white and AI/AN children residing in Alaska, Arizona, Montana, New Mexico, North Dakota, Oklahoma, and South Dakota because the survey in these seven states included American Indian and Alaska Native race as a distinct category. The response rate from these seven states ranged from 44.2 to 61.9 %. Only children aged 10–17 years were included in this analysis because parent report of a child's height and weight are not considered reliable for children aged <10 years [23].

Study Variables

A range of independent variables and potential confounders were considered for inclusion in this analysis based upon previous studies of overweight and obesity among children and adolescents [3–12].

Overweight and Obesity—Parent-reported data on children's height and weight were used to calculate body mass index [BMI: weight (kg) ÷ height (m)²]. Overweight (BMI: 85th–94th percentile for age and sex) and obesity (BMI: ≥95th percentile for age and sex) [24] were combined to create a single category (Overweight/Obese; BMI: ≥85th percentile for age and sex) because this analysis lacked sufficient statistical power to consider these two categories separately. Healthy weight children (BMI: 5th–84th percentile for age and sex) served as the reference group for all analyses. Underweight children (BMI <5th percentile for age and sex) were excluded from analyses (n = 274).

Weight-Related Behaviors—Behaviors known from previous studies to be associated with obesity among children were examined, including past year sports team participation (yes, no), vigorous physical activity (days per week: 0–3, 4–6, 7), television viewing (hours per day: 0–2, >2), and computer use (hours per day: 0–2, >2). To assess sports team

participation, parents were asked, “During the past 12 months, was [child’s name] on a sports team or did [s/he] take sports lessons after school or on the weekends?” Child’s physical activity was assessed by asking parents, “During the past week, on how many days did [child’s name] exercise, play a sport, or participate in physical activity for at least 20 min that made [him/her] sweat and breathe hard?” Physical activity frequency was categorized as 7 versus <7 days based on the frequency of physical activity recommended in the Physical Activity Guidelines for Americans [25]; the characterization of this variable is not consistent with the time and intensity components of the recommendation due to the wording of the question and available response options. Television viewing was ascertained by asking parents, “On an average weekday, about how much time does [child’s name] usually watch television, watch videos, or play video games?” Computer use was assessed by asking parents, “On an average weekday, about how much time does [child’s name] use a computer for purposes other than schoolwork?” Television viewing and computer use were categorized using the American Academy of Pediatrics guidelines that were current at the time that the survey was conducted [26].

Household Environment—Household environment included parental physical activity (days per week:<5, 5), frequency of meals eaten together as a family (days per week:<5, 5), the existence of rules about television programming (yes, no), and the presence of a television in the child’s bedroom (yes, no). Parental physical activity was assessed by asking the same question used to ascertain the child’s frequency of physical activity. Father’s physical activity was used only if mother’s physical activity was missing. The following questions were used to assess the remaining household environment characteristics: *frequency of family meals*—“During the past week, how many days did all the family members who live in the household eat a meal together?”; *rules limiting television programming*—“Are there family rules about what television programs [child’s name] is allowed to watch?”; *television in child’s bedroom*—“Is there a television in [child’s name] bedroom?”

Neighborhood Environment—The neighborhood environment included social and physical environments, which were assessed by parent’s report of perceived neighborhood support (none, low, moderate/high), perceived community and school safety (safe, not safe), and the existence of parks, sidewalks, and recreation centers (yes, no). Responses to four items were summed to create an index describing parent’s perceived level of neighborhood social support (range: 4–16). The items were: “People in this neighborhood help each other out,” “We watch out for each other’s children in this neighborhood,” “There are people I can count on in this neighborhood,” and “If my child were playing outside and got hurt or scared, there are adults nearby who I trust to help my child.” The index was then categorized into 3 levels representing no [12–16], low [9–11], and moderate/high perceived social support [4–8]. Perceived school and community safety were measured by the following two questions: “How often do you feel [CHILD’S NAME] is safe in your community or neighborhood?” and “How often do you feel he/she is safe at school?” Responses of “Always” and “Usually” were recoded as “safe”; responses of “Never” and “Sometimes” were recoded as “not safe.”

Demographic and Socioeconomic Characteristics—Demographic and socioeconomic characteristics included child’s age (10–11, 12–14, 15–17 years), sex, household income reported as percent of the 2007 federal poverty level (FPL, <100 %, 100–399 %, 400 %) [27], and household composition (two parents, single mother, other). Multiply-imputed household income data, available from the NSCH, were used when household income was not reported by the respondent (8.5 % of sampled households); the single imputation household income variable was used in this analysis [22].

Statistical Analysis

Differences in characteristics between NHW and AI/AN children were tested using Chi square statistics. Bivariate associations between overweight/obesity and each sociodemographic, environmental, household, and behavioral variable were assessed using pooled and race-stratified logistic regression. Race-specific odds ratios from the bivariate analysis were compared for differences in relative magnitude of 20 % or greater between NHW and AI/AN children. A product term with race was created for each variable that met this criterion (i.e., child’s age, family structure, and sports team participation), and a new pooled model including these interaction terms in addition to all variables with significant odds ratios in the pooled bivariate regressions was specified. Given the small number of AI/AN children included in the sample, a post hoc decision was made to set the significance level for keeping an interaction term in the regression model at $p < 0.20$ [28]. Sex-specific interaction terms with physical activity, sports participation, and television viewing were tested in a similar fashion. Models were assessed for collinearity and confounding before arriving at the final model [29]. All analyses were conducted using complex survey procedures in SAS-callable SUDAAN version 9.2 (SAS Institute Inc., Cary, NC, USA). An EFFECTS statement was used to estimate the stratum-specific odds ratios based on the interaction terms presented in Table 3. A sensitivity analysis was also performed to test whether participation in sports impacted overweight/obesity through an increase in vigorous physical activity.

Results

The distribution of characteristics among NHW and AI/AN children included in the sample are shown in Table 1. Compared with NHW children, a higher percentage of AI/AN children ate meals together as a family on at least 5 days of the week and had parents who participated in physical activity on at least 5 days of the week. A lower percentage of parents of AI/AN children reported feeling that their children were safe at school as compared to parents of NHW children. Similarly, a lower percentage of AI/AN children lived in neighborhoods with one or more parks. Household incomes less than 100 % of the FPL were more common among AI/AN children and fewer AI/AN children lived in two-parent households compared to NHW children. AI/AN and NHW children included in the sample had similar distributions of other weight-related, household, neighborhood, and sociodemographic characteristics.

Bivariate Analyses

The prevalence of overweight/obesity was 29.0 % (95 % CI = 26.2–31.8) among NHW children and 48.3 % (95 % CI = 38.8–58.0) among AI/AN children (Table 2). Results from bivariate analyses demonstrated that correlates of overweight and obesity differed between NHW and AI/AN children. For example, not participating in team sports was marginally associated with higher odds of overweight/obesity among AI/AN children only (OR = 2.095 % CI = 1.0–4.4). Watching more than 2 h of television was associated with higher odds of overweight/obesity among NHW (OR = 2.4, 95 % CI = 1.7–3.4) children, but not among AI/AN children (OR = 1.5, 95 % CI = 0.7–3.4). Regarding the household environment, the presence of a television in the child’s bedroom was associated with marginally higher odds of overweight/obesity for NHW children (OR = 1.3, 95 % CI = 1.0–1.7). Although it failed to reach statistical significance, the odds of overweight/obesity among AI/AN children with a television in their bedroom was elevated. With regard to the perceived neighborhood environment, perceived lack of neighborhood support was significantly associated with higher odds of overweight/obesity among NHW children (OR = 2.4, 95 % CI = 1.3–4.4). Younger age, male sex, household income less than 400 % of the FPL were significantly associated with higher odds of overweight/obesity among NHW children. In general, similar associations were observed among AI/AN children, although these relationships failed to reach statistical significance. Finally, being from a single mother household was associated with higher odds of overweight/obesity among NHW children (OR = 2.1, 95 % CI = 1.4–3.1); however, among AI/AN children, an “Other” household structure was significantly associated with higher odds of overweight/obesity compared to those living in a two-parent household (OR = 2.8, 95 % CI = 1.1–7.3).

Multivariable Analyses

Child’s sports team participation, television viewing, parental perceived neighborhood support, child’s age and sex, household poverty status, and family structure were included in the final pooled multivariable regression model. A race/ethnicity by sports team participation interaction term was also included in the final model ($p = 0.18$). Not participating in team sports was significantly associated with a higher odds of overweight/obesity among AI/AN children (aOR = 2.7, 95 % CI = 1.3–5.2), but not among NHW children (aOR = 1.8, 95 % CI = 0.8–4.2). Among all children in the sample, television viewing >2 h per day (aOR = 2.0, 95 % CI = 1.5–2.8), lack of perceived neighborhood support (aOR = 1.9, 95 % CI = 1.1–3.5), child’s age (10–11 vs. 16–17 years: adjusted odds ratio [aOR] = 2.5, 95 % CI = 1.7–3.5), male sex (aOR = 1.6, 95 % CI = 1.2–2.1), household income less than 400 % of the FPL (<100 % FPL: aOR = 2.9, 95 % CI = 1.7–5.1; 100–399 % FPL: aOR = 1.6, 95 % CI = 1.2–2.1), and “other” family structure (aOR = 1.9, 95 % CI = 1.2–2.8) were all significantly associated with a higher odds of overweight/obesity.

Discussion

In general, factors associated with overweight/obesity did not differ between NHW and AI/AN children, with the exception of sports team participation, which was differentially related to overweight/obesity among the two racial/ethnic categories. AI/AN children who did not participate on a sports team had a statistically significantly increased odds of being

overweight or obese compared to AI/AN children who were involved in team sports; this association was not statistically significant among NHW children, although the direction of the association was the same. The association between lack of participation in team sports and overweight/obesity among AI/AN children remained even after adjustment for vigorous physical activity in sensitivity analyses. Participation in team sports may be important for addressing the disparate rates of overweight and obesity among AI/AN children. However, additional studies among this population, including studies with a longitudinal design are needed to confirm these findings as it is also possible that overweight children are simply less likely to participate in team sports.

A potential challenge of using sports participation as a mechanism for increasing physical activity among AI/AN children includes limited access to team sport activities in this population. The most commonly reported barriers to engaging in physical activity among AI/AN youth and their parents are a lack of sports or physical activity programming near the home; not having transportation to/from their community recreation or fitness facility where activities are available; and having concerns about the safety of available facilities [30–32]. Interventions could consist of increasing the number of safe and easily accessible sports facilities among these populations, either in a school or another setting. Alternatively, if funds were not available for this type of infrastructure building, focus could be directed towards improving the level of access AI/AN children have to facilities that already exist, for example providing safe and reliable group transport for children from their homes or schools to sports facilities.

Another potential drawback to interventions focusing on sports participation is that these interventions may differentially affect AI/AN children based on their sex. Although we did not observe evidence of an interaction between sports participation and sex, a previous study found that American Indian boys participated in significantly more weekly sports than girls [33]. Though the study sample was predominantly comprised of white children, another study found that an intervention to engage children in physical activity had a greater impact on the overall daily physical activity of male children, than on that of female children [34]. Monitoring and evaluating all programs implemented to target sports participation among AI/AN children may be necessary to address concerns about potential discrepancies in reach and effectiveness of these interventions between genders.

There were additional factors related to overweight and obesity in the pooled sample which merit discussion, such as perceived lack of neighborhood social support. High levels of social capital within communities can influence health through the spread of healthy norms among youth [35]. However, there is a gap in the literature describing interventions designed to improve social capital within communities. Although having a television in the child's bedroom and parental rules limiting television viewing were not associated with overweight and obesity in this sample, watching more than 2 h of television a day was a significant predictor in our study. Multiple interventions have been shown to reduce the amount of television watched by children [36–38]; however, these may need to be modified for Native populations. For example, high poverty levels and a severe shortage of housing on many reservations often leads to multiple families living in one house. With an entire family living in one room, a child would not have their own bedroom, and attempting to decrease the

amount of television the child watches would require the cooperation of all members of the household. Interventions targeting a reduction in children's television viewing by reducing family viewing time show promise [39] and may be particularly relevant to AI/AN populations.

Many of the significant predictors of overweight and obesity among our sample are impossible or extremely difficult to modify, such as child's age and sex, and household poverty status and structure. While these characteristics themselves cannot be altered, new interventions could be developed or existing interventions could be modified to specifically focus on the subpopulations among children which are at a high risk for overweight/obesity. Alternatively, interventions that address social determinants of health have the potential to alleviate a wide variety of health outcomes [40].

The findings of our study should be considered in light of some limitations. First, this study did not consider the impact of diet on overweight/obesity among children. Secondly, the cross-sectional design of the NSCH means that temporality cannot be established among the risk factors examined in our analysis and overweight and obesity. This lack of temporality results in the inability to infer causality between any of the factors we found to be statistically significant, and overweight and obesity. In order to determine causality, prospective studies of the development of overweight and obesity among AI/AN children are necessary. Additionally, due to small sample size, overweight and obese children were combined into a single category in our analysis, and we were unable to examine predictors of overweight and obesity separately. We were also unable to examine the differential effect of risk factors on children who live in urban versus rural areas using the publicly accessible 2007 NSCH dataset. However, further studies utilizing the restricted 2007 NSCH dataset may be able to address this limitation. Finally, because our analysis was limited to AI/AN children and NHW children aged 10–17 years, the results may not be generalizable to children of all ages and races/ethnicities in the included states.

Many complex factors contribute to childhood overweight and obesity, and these factors can have differential effects between racial/ethnic groups. This analysis examined contextual and individual factors thought to be associated with overweight and obesity by using a population-based sample that allowed a comparison to be made between AI/AN children and NHW children. Targeting individual risk factors to reduce overweight and obesity among minority groups is a strategy which has been shown to be effective [41]. Developing culturally sensitive interventions that focus on individual risk and protective factors for overweight and obesity, such as team sports participation and television viewing, and contextual factors such as neighborhood social support, could reveal opportunities for interventions to prevent unhealthy weight and related consequences among NHW and AI/AN children.

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Table 1

Description of behavioral, household, neighborhood, and sociodemographic characteristics of American Indian/Alaska Native and non-Hispanic white children ages 10–17 years in seven states: National Survey of Children's Health, 2007 (unweighted sample sizes, weighted percentages)

	All (n = 5,342)	Non-Hispanic White (n = 4,956)	American Indian/Alaska Native (n = 386)	p Value
	%	%	%	
<i>Child's weight-related behaviors</i>				
Child's sports team participation				
No	41.8	41.2	46.9	0.31
Yes	58.2	58.8	53.1	
Child's vigorous physical activity, days per week				
0–3	40.9	41.5	36.1	0.14
4–6	35.3	35.9	30.4	
7	23.8	22.7	33.6	
Child's television viewing, hours/day				
0–2	78.7	78.9	76.9	0.60
>2	21.3	21.1	23.1	
Child's computer use, hours/day				
0–2	85.6	86.3	78.8	0.14
>2	14.4	13.7	21.2	
<i>Household environment</i>				
Parent physical activity, days per week				
<5	75.8	77.1	64.5	0.04
5	24.2	22.9	35.5	
Frequency of family meals, days per week				
<5	36.3	38.4	19.4	<0.001
5	63.7	61.6	80.6	
Rules limiting television viewing				
No	17.4	16.5	24.1	0.18
Yes	82.6	83.5	75.9	
Television in child's bedroom				
No	50.2	49.7	54.6	0.36
Yes	49.8	50.3	45.4	
<i>Perceived neighborhood environment</i>				
Perceived neighborhood support				
None	5.2	5.1	5.6	0.36
Low	9.0	8.4	13.5	
Moderate/high	85.8	86.4	80.9	
Perceived community safety				
Not safe	11.4	10.9	15.9	0.14
Safe	88.6	89.1	84.1	

	All (n = 5,342)	Non-Hispanic White (n = 4,956)	American Indian/ Alaska Native (n = 386)	p Value
	%	%	%	
Perceived school safety				
Not safe	9.5	7.6	24.6	0.001
Safe	90.5	92.4	75.4	
Parks in neighborhood				
No	23.1	21.6	35.4	0.007
Yes	76.9	78.4	64.6	
Sidewalks in neighborhood				
No	30.8	30.4	34.7	0.37
Yes	69.2	69.6	65.3	
Recreation centers in neighborhood				
No	39.1	39.0	40.1	0.84
Yes	60.9	61.0	59.9	
<i>Sociodemographic characteristics</i>				
Child's age, years				
10–11	25.4	25.7	22.4	0.67
12–14	37.1	36.7	40.9	
15–17	37.5	37.6	36.6	
Child's sex				
Male	52.1	52.3	49.9	0.65
Female	47.9	47.7	50.1	
Household poverty status, % FPL				
<100	16.0	14.1	31.3	<0.001
100–399	58.4	58.6	57.0	
400	25.6	27.3	11.7	
Household structure				
Two parents	74.0	76.0	57.3	0.002
Single mother	17.4	16.0	28.8	
Other	8.6	8.0	13.9	

FPL federal poverty level

Bivariate associations between overweight/obesity and behavioral, household, neighborhood, and sociodemographic characteristics of American Indian/Alaska Native and non-Hispanic white children ages 10–17 years in seven states: National Survey of Children’s Health, 2007 (unweighted sample sizes, weighted percentages)

Table 2

	All (n = 5,342)	Non-Hispanic white (n = 4956)	American Indian/Alaska Native (n = 386)
Overall	31.1 (95 % CI = 29.4–33.9)	29.0 (95 % CI = 26.2–31.8)	48.3 (95 % CI = 38.8–58.0)
<i>Child’s weight-related behaviors</i>			
Child’s sports team participation			
No	34.5	31.5	58.3
Yes	28.6	27.2	40.7
Child’s vigorous physical activity, days per week			
0–3	32.9	31.2	50.2
4–6	28.8	26.3	52.0
7	31.7	29.7	43.0
Child’s television viewing, hours per day			
0–2	27.0	24.9	46.1
>2	46.2	44.6	56.7
Child’s computer use, hours per day			
0–2	28.4	26.9	44.9
>2	36.8	33.5	58.4
<i>Household environment</i>			
Parent physical activity, days per week			
<5	30.6	28.7	49.2
5	31.1	30.1	37.9
Frequency of family meals, days per week			
<5	28.4	27.9	36.3
5	32.6	29.7	51.6
Rules limiting television viewing			

	All (n = 5,342)			Non-Hispanic white (n = 4956)			American Indian/Alaska Native (n = 386)		
	%Overweight/ obese	OR (95% CI)	%Overweight/ Obese	OR (95% CI)	%Overweight/ obese	OR (95% CI)	%Overweight/ obese	OR (95% CI)	
No	28.2	1.0	25.5	1.0	49.0	1.0	1.0	1.0	
Yes	31.7	0.8 (0.6–1.2)	29.7	0.8 (0.6–1.1)	48.3	1.0 (0.4–2.9)	1.0 (0.4–2.9)	1.0 (0.4–2.9)	
Television in child's bedroom									
No	28.1	1.0	26.2	1.0	41.7	1.0	1.0	1.0	
Yes	34.2	1.3 (1.0–1.7)	31.8	1.3 (1.0–1.7)	57.1	1.9 (0.9–4.0)	1.9 (0.9–4.0)	1.9 (0.9–4.0)	
<i>Perceived neighborhood environment</i>									
Perceived neighborhood support									
None	50.7	2.4 (1.4–4.3)	47.7	2.4 (1.3–4.4)	72.3	2.8 (0.7–12.3)	2.8 (0.7–12.3)	2.8 (0.7–12.3)	
Low	30.6	1.0 (0.7–1.6)	28.3	1.0 (0.6–1.6)	40.5	0.7 (0.2–2.3)	0.7 (0.2–2.3)	0.7 (0.2–2.3)	
Moderate/high	29.9	1.0	27.8	1.0	48.0	1.0	1.0	1.0	
Perceived community safety									
Not safe	37.8	1.4 (0.9–2.2)	33.9	1.3 (0.8–2.2)	56.8	1.5 (0.6–3.8)	1.5 (0.6–3.8)	1.5 (0.6–3.8)	
Safe	30.1	1.0	28.2	1.0	46.7	1.0	1.0	1.0	
Perceived school safety									
Not safe	37.8	1.4 (0.9–2.2)	30.5	1.1 (0.6–1.9)	55.8	1.6 (0.6–4.3)	1.6 (0.6–4.3)	1.6 (0.6–4.3)	
Safe	30.5	1.0	29.1	1.0	44.3	1.0	1.0	1.0	
Parks in neighborhood									
No	33.6	1.2 (0.9–1.6)	31.0	1.1 (0.8–1.6)	45.4	0.8 (0.4–1.9)	0.8 (0.4–1.9)	0.8 (0.4–1.9)	
Yes	30.3	1.0	28.4	1.0	50.2	1.0	1.0	1.0	
Sidewalks in neighborhood									
No	31.5	1.0 (0.8–1.4)	29.2	1.0 (0.8–1.4)	46.5	0.9 (0.4–2.0)	0.9 (0.4–2.0)	0.9 (0.4–2.0)	
Yes	30.9	1.0	28.9	1.0	49.4	1.0	1.0	1.0	
Recreation centers in neighborhood									
No	34.2	1.3 (1.0–1.7)	31.5	1.2 (0.9–1.6)	58.0	1.8 (0.8–4.4)	1.8 (0.8–4.4)	1.8 (0.8–4.4)	
Yes	29.0	1.0	27.1	1.0	43.0	1.0	1.0	1.0	
<i>Sociodemographic characteristics</i>									
Child's age, years									
10–11	43.8	2.2 (1.6–3.1)	40.9	2.2 (1.6–3.2)	68.7	2.5 (0.7–8.6)	2.5 (0.7–8.6)	2.5 (0.7–8.6)	
12–14	28.5	1.1 (0.9–1.5)	27.1	1.2 (0.9–1.6)	39.1	0.7 (0.3–1.7)	0.7 (0.3–1.7)	0.7 (0.3–1.7)	

	All (n = 5,342)		Non-Hispanic white (n = 4956)		American Indian/Alaska Native (n = 386)	
	%Overweight/ obese	OR (95 % CI)	%Overweight/ Obese	OR (95 % CI)	%Overweight/ obese	OR (95 % CI)
15–17	25.9	1.0	23.7	1.0	46.5	1.0
Child's sex						
Male	35.5	1.5 (1.2–2.0)	33.3	1.6 (1.2–2.0)	56.9	1.9 (0.8–4.2)
Female	26.4	1.0	24.3	1.0	41.3	1.0
Household poverty status, %FPL						
<100	48.4	3.9 (2.4–6.2)	45.1	3.5 (2.0–6.0)	58.1	3.0 (0.9–9.6)
100–399	32.1	2.0 (1.5–2.6)	30.6	1.9 (1.4–2.5)	45.6	1.8 (0.7–4.9)
400	19.4	1.0	18.9	1.0	31.6	1.0
Household structure						
Two parents	27.3	1.0	25.8	1.0	45.0	1.0
Single mother	42.1	1.9 (1.3–2.8)	41.7	2.1 (1.4–3.1)	44.0	1.0 (0.4–2.5)
Other	41.2	1.9 (1.2–2.9)	34.7	1.5 (0.9–2.5)	69.5	2.8 (1.1–7.3)

OR odds ratio, CI confidence interval, FPL federal poverty level

Table 3

Results of multivariable logistic regression analysis describing the association between behavioral, household, neighborhood, and sociodemographic characteristics, and overweight/obesity among American Indian/Alaska Native and non-Hispanic white children ages 10–17 years in seven states: National Survey of Children's Health, 2007

	Adjusted odds ratio	95 % Confidence interval
Child's sports team participation ^a		
No, among non-Hispanic white	1.8	0.8–4.2
Yes, among non-Hispanic white	1.0	Ref
No, among American Indian/Alaska Native	2.7	1.3–5.2
Yes, among American Indian/Alaska Native	1.0	Ref
Child's television viewing, hours/day		
0–2	1.0	Ref
>2	2.0	1.5–2.8
Perceived neighborhood support		
None	1.9	1.1–3.5
Low	0.9	0.6–1.3
Moderate/high	1.0	Ref
Child's age, years		
10–11	2.5	1.7–3.5
12–14	1.2	0.9–1.6
15–17	1.0	Ref
Child's sex		
Male	1.6	1.2–2.1
Female	1.0	Ref
Household poverty status, %FPL		
<100	2.9	1.7–5.1
100–399	1.6	1.2–2.1
400	1.0	Ref
Household structure		
Two parents	1.0	Ref
Single mother	1.4	0.9–2.0
Other	1.9	1.2–2.8

Unweighted sample size = 4,743; Adjusted for all variables simultaneously

FPL federal poverty level

^a *p*-Value for interaction term (race/ethnicity × sports team participation) = 0.18