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Determinants of sugar-sweetened beverage consumption among low-income children: are there differences by race/ethnicity, age, and gender?

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Abstract

Background—Understanding determinants of high consumption of sugar-sweetened beverages (SSB), a highly prevalent obesogenic behavior, will help build effective customized public health interventions.

Objective—To identify child and parent lifestyle and household demographic factors predictive of high SSB consumption frequency in children from low-income, ethnically diverse communities that may help inform public health interventions.

Design—Cross-sectional telephone household survey.

Participants/Setting—717 boys and 686 girls 3–18 years old from the New Jersey Childhood Obesity Study living in five low-income cities (Camden, New Brunswick, Newark, Trenton, and Vineland). The adult most knowledgeable about household food shopping completed a

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questionnaire over the telephone inquiring about their and their child's dietary and physical activity habits, and household-, parent-, and child-level demographics.

Main outcome measures—Child's SSB consumption frequency.

Statistical analysis performed—Multivariate ordered logit models were designed to investigate a variety of variables hypothesized to affect the frequency of SSB consumption. Exploratory stratified analyses by race, gender, and age were also conducted.

Results—Eight percent of our study participants never consumed SSBs, 45% consumed SSBs at least once per day, and 23% consumed twice or more per day. SSB consumption was higher among children 12–18 vs. 3–5 years ($p<0.0001$), of non-Hispanic black vs. non-Hispanic white race/ethnicity ($p=0.010$), who were moderate fast food consumers vs. never consumers ($p=0.003$), and those whose parents were high vs. low SSB consumers ($p<0.0001$). Living in a non-English speaking household ($p=0.030$), having a parent with a college or higher education vs. less than high school ($p=0.003$), and having breakfast 6–7 days/week vs. never to twice/week were associated with lower SSB consumption ($p=0.001$).

Conclusions—We identified a number of household-, parental-, and child-level predictors of SSB consumption, which varied by race, gender and age, useful for building customized interventions targeting certain behaviors in ethnically diverse, low-income children.

Keywords

Sugar sweetened beverages; children; low-income population; lifestyle determinants; household determinants

Introduction

Sugar sweetened beverages (SSB), including soda, fruit-flavored drinks, and sports drinks, are a major contributor to added sugars in children's diets and have been shown to be associated with obesity.^{1–4} Approximately 17% of children ages 2–19 years were considered obese in 2011–2014.⁵ This is problematic as children who are obese are more likely to be obese as adults.⁶

The rates of obesity and SSB consumption affect certain populations more than others. The prevalence of obesity is higher in adolescents than in young children. While only 8.9% of children ages 2–5 years were considered obese in 2011–2014, 17.5% of 6–11 year-olds, and 20.5% of 12–19 year-olds were found to be obese.⁵ Non-Hispanic black children and Hispanic children ages 2–19 years have a higher prevalence of obesity, at 19.5% and 21.9%, respectively, compared to non-Hispanic white (14.7%).⁵ Non-Hispanic black and Hispanic children are also more likely to consume more total SSB than non-Hispanic white children.^{7–10} Previous studies have found that older children and adolescents are more likely to consume SSB than younger children.^{11, 12} A comparison of National Health and Nutrition Examination Survey (NHANES) data from cycles 1988–1994 to 1999–2004 showed the largest increases in SSB consumption was among children 6–11 years old. While no changes were observed among non-Hispanic white adolescents, there were significant increases in consumption among non-Hispanic blacks and Hispanics.¹²

Other factors associated with SSB consumption include gender, physical activity, sedentary behavior, school environment, parental SSB intake, and other dietary behaviors. Evidence shows that males are more likely to consume SSB than females.^{8, 11, 13} SSB consumption is usually negatively associated with physical activity and positively associated with sedentary behaviors, such as watching television.^{9, 11, 14} The school environment, the use of vending machines in particular, was found to be associated with a higher intake of SSB.⁷ Children whose parents drank SSB were more likely to consume soft drinks regularly.¹⁴ Consuming SSB is also associated with other unhealthy eating behaviors, such as eating at fast food restaurants, low vegetable consumption, and high consumption of unhealthy meats, French fries, and desserts.^{8, 9, 13}

While non-Hispanic black and Hispanic children are at a higher risk for obesity and have high consumption of SSB, previous studies that have examined the determinants of SSB have either not considered race/ethnicity¹⁴ or had non-Hispanic white children as the majority of participants.^{8, 9, 11, 13} Moreover, most studies that examined determinants of SSB among children have focused only on middle and/or high school students.^{7-9, 13, 14} Lastly, many studies have lacked household and socioeconomic factors,^{7, 8, 13, 14} which in one study have been found to be significant determinants in SSB intake among children.¹⁰ Importantly, no study to date has examined determinants in minority populations across all age groups of children with household socioeconomic factors, parental intake, as well as child behaviors in the same model. The purpose of our study is to examine the association of child and parent lifestyle, and household demographic factors with the frequency of SSB consumption in children ages 3–18 years from low-income communities with high non-Hispanic black and Hispanic populations. These analyses will inform the design of tailored interventions to decrease levels of SSB intake in vulnerable, underserved population groups.

Material and Methods

We used data from the New Jersey Childhood Obesity Study, collected during 2009 and 2010 by a random digit dial household survey of 1,708 families living in five low-income cities in New Jersey (Camden, New Brunswick, Newark, Trenton, and Vineland). Only households with at least one 3–18 year old child were included in the New Jersey Childhood Obesity Study; if a household had more than one child in the targeted age group, the surveyed child was randomly selected, using a computer program. Households that were neither English nor Spanish speaking were not eligible to participate. The response rate for the survey was 49%. The study protocol was approved by the Institutional Review Board of Rutgers University and Arizona State University, and all participants provided verbal consent over the telephone.

The adult most knowledgeable about household food shopping completed a 36 minute long interviewer-administered questionnaire over the telephone inquiring about their and their child's dietary and physical activity habits, and household-, parent-, and child-level demographics. In 94% of the cases, the respondent was the parent or the grandparent of the child included in the survey; consequently, respondents are referred to as parents in this paper. To assess the child's and parent's SSB consumption frequency, parents were asked "How often over the past month (i.e., times per month, week, or day) did the child and you

drink i) regular carbonated soda or soft drinks that are sweetened, such as Coke, Pepsi, or 7-Up (not including diet drinks) and ii) fruit flavored drinks such as lemonade, Sunny Delight, Kool-aid, Gatoraid, or sweet iced tea (not including 100% fruit juice).” The frequency of consumption of these two types of beverages was combined to estimate the overall SSB consumption frequency used in the analysis. Other child’s dietary habits assessed included frequency of fast food consumption (times per month, week, or day) and breakfast consumption (number of days in a typical week) over the previous month. Information on child’s screen time (watching TV, playing video games, or using a computer) in hours per day, in a typical day during the school year, averaged over weekend and weekdays; and physical activity in days over the past week when the child was physically active [defined as activity that increased (his/her) heart rate and made (him/her) breath hard] for a total of at least 30 minutes per day; was also collected. The questionnaire also queried about child’s age, gender, race and ethnicity, parent’s highest grade or level of school completed, and the primary language spoken in the household. If responses on the question “What is the primary language spoken in your home?” were something other than English or Spanish, participants were asked to specify which language, and the response was marked as “other”. Participants were asked if they and/or their child were born outside of the United States, but not which country. The survey questionnaire was a composite of questions from other validated tools, including the Youth Risk Behavior Surveillance System (physical activity),¹⁵ California Health Interview Study (screen time),¹⁶ and Behavioral Risk Factor Surveillance System (diet, demographics).¹⁷

Out of 1,708 participants who completed the survey, 1,403 had complete data on all variables included in the analysis. The analytical sample (n=1,403) included 717 boys and 686 girls.

Statistical Analysis

All analyses were conducted using STATA version 12 (StataCorp LP, College Station, Texas). Based on the literature, we examined a variety of independent variables hypothesized to affect the frequency of SSB consumption among children. These included the children’s gender, age, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), non-English speaking households (yes, no), fast food consumption (none [never], moderate [< 2 times per week], high [≥ 2 times per week]), screen time (low [0 to < 2 h per day], moderate [2h to < 4 h per day], high [≥ 4 h per day]), physical activity (low [never or 1 day per week], moderate [2 to 5 days per week], high [6 to 7 days per week]), breakfast consumption (low [never to 2 days per week], moderate [3 to 5 days per week], high [6 to 7 days per week]), parent’s education (less than high school, high school, college education or higher), and parent’s frequency of SSB consumption (low [none to < 1 time per day], moderate [1 to < 7 times per week], high [≥ 7 times per day]). Our main outcome variable was the child’s SSB consumption frequency, which was placed into five categories using the following cut-off points based on the SSB consumption distribution in our sample: no consumption; >0 to <0.5 times per day; 0.5 to <1 times per day; 1 to <2 times per day; and ≥ 2 times per day. Data were weighted to be representative of the population of the five cities, and adjusted for the complex survey design, including clustering at the city level, using the ‘svy’ prefix for commands in STATA.

Descriptive statistics were calculated to investigate the association between SSB consumption frequency and each of the independent variables. Multivariate analysis were conducted using ordered logit models to determine which variables were most predictive of SSB consumption controlling for the effect of all other independent variables. Using this framework, we examined how each independent variable shifts the distribution of SSB consumption categories while holding the other independent variables constant. For example, a significant and positive coefficient from the ordered logit model for a particular independent variable implies that an increase in the value of that variable would shift the distribution of SSB consumption categories towards the right in favor of more frequent consumption. To estimate the magnitude of change in probability of being in each category when the value of the variable was increased, we used the STATA ‘margins’ command to transform the coefficients obtained from ordered logit model. All results presented describe the change in probability of a child being in one of the five consumption categories based on their classification on a particular independent variable (relative to the reference group) after adjusting for the effects of other variables in the model. These analyses, conducted with the full analytical sample, are referred to as combined analysis in the paper.

Finally, we conducted additional exploratory analyses to determine whether the results of the ordered logit models differ by child’s gender, race/ethnicity, and age group. Specifically, we estimated the models for subgroups and reported observed differences in the sign and statistical significance of the estimated ordered logit coefficients. To check if participants with missing data (n=305) differed on any characteristics, we ran descriptive statistics on the full sample (n=1,708), however the distribution of demographics and lifestyle characteristics by frequency of SSB consumption in the full sample was very similar to the distribution in the analytical sample (n=1,403) (data not shown). The *P* values for the statistical tests were 2 tailed and were considered statistically significant at a level of <0.05.

Results

The study sample included a similar proportion of males (51%) and females (49%). Forty three percent of the children were Hispanic, 40% were non-Hispanic black, and 13% were non-Hispanic white (Table 1). Eight percent never consumed SSBs, whereas 45% consumed SSBs at least once per day, and 23% consumed twice or more per day. In a bivariate analysis, all investigated characteristics were significantly associated with frequency of SSB consumption, except for gender and physical activity. Child-level characteristics associated with the highest SSB consumption categories included being an adolescent (aged 12–18 years), non-Hispanic white, or non-Hispanic black; a high consumption of fast food; low breakfast consumption; and a high screen time. Parent- and household-level characteristics associated with the highest SSB consumption frequency included English-speaking household, parents with less than high school education, and parents who were high SSBs consumers.

Table 2 shows the marginal effects from the ordered logit model, which indicate how each of the independent variables affects the probability of being in each of the SSB consumption categories. Relative to children ages 3–5, the SSB consumption distribution for children ages 12–18 years was shifted towards higher SSB consumption ($p<0.0001$). Compared to

children aged 3–5, those aged 12–18 years were 13 percentage points more likely to consume SSBs twice or more per day and 6 percentage points less likely to never consume SSBs. A similar pattern appeared for children ages 6–11 relative to children ages 3–5, but the effect sizes were much smaller and did not reach statistical significance ($p=0.080$).

Compared to non-Hispanic white children, non-Hispanic black children had an SSB distribution that was shifted toward higher consumption levels, after controlling for other variables ($p=0.010$). The SSB consumption distributions for Hispanic children ($p=0.150$) and for children from other races ($p=0.300$) were not significantly different from the distribution for non-Hispanic white children. Other factors that were associated with large and statistically significant shifts toward lower frequency of consumption included living in a non-English speaking household, having a parent with college education or higher vs. less than high school and moderate consumption of breakfast vs. low consumption. A moderate or high parental SSB consumption vs. low consumption were also associated with large and statistically significant shifts toward higher frequency of SSB consumption ($p=0.001$ and $p<0.0001$, respectively). Furthermore, moderate fast food consumption compared to never was associated with statistically significant shifts towards higher SSB consumption ($p=0.003$), whereas a high consumption vs. never did not reach statistical significance ($p=0.070$), possibly due to lower number of children in this group (19.7%). We found no association between SSB consumption and screen time or physical activity.

Race/ethnicity subgroups

In analysis by race/ethnicity (see Table 3), in non-Hispanic white and Hispanic children, those ages 6–11 years and 12–18 years (vs. 3–5 years), and whose parents consumed SSB moderately or high vs. low had SSB distribution significantly shifted toward greater SSB consumption frequency. Among Hispanic children, high fast food consumption ($p=0.020$) and moderate screen time ($p=0.020$) were associated with statistically significant shifts towards greater SSB consumption. Having a parent with college education or higher ($p=0.004$) and high breakfast consumption ($p=0.040$) were associated with leftward shifts of the SSB consumption distribution toward a lower frequency of consumption. Among non-Hispanic black children, the SSB consumption distribution was statistically significantly shifted toward lower consumption when parents had college education or higher (vs. less than high school) ($p=0.030$) and when children had a moderate or high breakfast consumption ($p=0.010$ and $p=0.010$, respectively). Further, for non-Hispanic black children who consumed fast food moderately vs. never, and whose parents had a high consumption of SSB (vs. low), the SSB consumption distribution was shifted toward higher frequency of consumption ($p=0.020$ and $p<0.0001$, respectively).

Age subgroups

Investigation of the relationship between demographics, household factors, and dietary and physical activity habits, and SSB consumption by age group showed that while moderate or high consumption of breakfast (vs. low) was associated with significant shifts of the SSB consumption distribution toward higher consumption among 3–5 year olds, the trend was opposite among 6–11 and 12–18 year olds (Table 4). Six to 11 year old children who were moderate or high consumers of breakfast were 15 and 21 percentage points less likely to be

in the highest SSB consumption category and 3 and 6 percentage points more likely to never consume SSBs, respectively. Similarly, being a moderate or high breakfast consumer was associated with significant shifts toward lower SSB consumption among 12–18 year olds ($p=0.010$ and $p=0.020$, respectively). Similar contrasting trends were observed for the association between physical activity and SSB consumption in 6–11 compared to 12–18 year olds. The SSB distribution in 6–11 year olds who had moderate or high levels of physical activity (vs. low) was significantly shifted toward greater SSB consumption ($p=0.040$ and $p=0.002$, respectively), while in 12–18 year olds who had moderate physical activity, the SSB distribution was significantly shifted toward lower SSB consumption ($p=0.030$). In 6–11 year olds, the female gender was associated with a shift toward lower consumption ($p=0.030$). On the other hand, a moderate or high parent SSB consumption ($p=0.002$ and $p<0.0001$, respectively), moderate fast food consumption ($p=0.030$), and a high amount of screen time ($p=0.010$) were associated with shifts toward greater consumption. In 12–18 year olds, living in a non-English speaking household ($p=0.020$) and having a parent with college education or higher ($p=0.001$) were associated with shifts of the distribution toward lower SSB consumption. The characteristics that were associated with significant shifts of the SSB consumption distribution toward greater consumption in this age group included being non-Hispanic black ($p=0.010$), having a parent consuming SSB moderately or high ($p=0.010$ and $p<0.0001$, respectively), and consuming fast food moderately or high ($p=0.030$ and $p=0.020$, respectively). Apart from breakfast consumption, none of the investigated variables was a significant determinant of SSB consumption in 3–5 year olds.

Gender subgroups

In the stratified analysis by gender (Table 5), we found that living in a non-English speaking household ($p<0.0001$), having a parent with college education or higher (vs. less than high school) ($p=0.002$) and moderate or high breakfast consumption ($p=0.010$ and $p<0.0001$, respectively) were associated with consumption distribution shifts toward lower SSB consumption among boys. Being 12–18 years old and having a parent consuming SSB moderately (in girls only) or high were associated with shifts of the distribution toward higher SSB consumption in both boys and girls. While being Hispanic shifted the SSB consumption distribution toward higher consumption among boys ($p=0.040$), being non-Hispanic black was associated with SSB distribution shifts toward greater SSB consumption among girls ($p=0.020$). In girls, consuming fast food moderately or high was also significantly associated with rightward shifts of the distribution toward higher SSB consumption ($p=0.001$ and $p=0.010$, respectively).

Discussion

In our population of 3–18 year old children living in five low-income communities in New Jersey, SSB consumption was higher among those who were older, of non-Hispanic black race/ethnicity, with high fast food consumption, and those whose parents were high SSB consumers. Living in a non-English speaking household, having a parent with a higher education level, and routinely having breakfast were associated with lower SSB consumption. The association of SSB consumption with screen time and physical activity was apparent only in certain subgroups. We observed a positive association with screen time

only among Hispanics and 6–11 year olds. While high physical activity was associated with high SSB consumption in 6–11 year olds, it was a determinant of low consumption amongst 12–18 years olds. We found no association between gender and SSB consumption.

Similar to our findings, a recent systematic review of 21 articles (12 from the U.S.) consistently found that consumption among children and adolescents increased with age.¹¹ From their multiethnic school-aged population of 9–17 years olds, Evans et al.¹⁸ reported that the consumption of SSB significantly increased by grade; 50% of the 4th graders were SSB consumers, whereas in the 11th grade 60% of the students were identified as consumers. We found no effect of gender on SSB consumption in our combined analysis, whereas in 6–11 year olds, female gender was a determinant of low SSB consumption. This is somewhat in line with the evidence so far, which have been consistently showing that the male gender is associated with higher odds of regular SSB consumption.^{8, 9, 11–13, 18}

We found non-Hispanic black race/ethnicity to be associated with high SSB consumption. While no significant differences in SSB consumption patterns by race or gender were observed in the systematic review by Rao et al.,¹¹ in a representative sample of the U.S. population aged 2 to 11 years based on NHANES 1999–2008 data, non-Hispanic black children were more likely to consume SSBs.¹⁰ Similarly, in 14–18 years olds from the 2010 National Youth Physical Activity and Nutrition Study (NYPANS), Park et al.⁸ observed that non-Hispanic black children were almost twice as likely to consume 3 or more SSB per day than non-Hispanic white children. In the 2010 Arizona Healthy Survey including 2,148 children under age of 6 years predominantly of non-Hispanic white or Hispanic origin, a significantly lower percentage of non-Hispanic white children reported drinking 1 SSB per day (7%) compared to Hispanic children (29%).¹⁹ In our study population, living in a non-English speaking household was a determinant of low SSB consumption. Similarly to what we found, in the state-wide School Physical Activity and Nutrition (SPAN) survey conducted in Texas 2004–2005, in children 11–18 years (n= 15,283), SSB consumption was lower among boys who reported speaking language other than English at home.⁹ English language spoken at home is a measure of acculturation that has been consistently positively associated with intake of sugar and SSB.²⁰

Our findings concur with those reported by others that show that education and income levels are strong determinants of SSB consumption.¹¹ Using NHANES data from 1999–2008, low parental education was shown to significantly increase the odds of moderate SSB consumption among 2–19 year olds, and of heavy consumption in adolescents (12–19 years).¹⁰ Ranjit et al. reported that soda consumption increased with economic disadvantage in girls whereas in boys it had only minor effect.⁹

We found both moderate and high consumption of fast food to be associated with high SSB intake. Eating in fast food restaurants at least once a week vs. never increased the likelihood of moderate and heavy SSB consumption in the 2010 NYPANS.⁸ Wiecha et al. reported a 0.49 and 1.64 more servings of SSB consumed per day in children (11–14 years) consuming fast food 2–3 and 4 or more times per week, respectively.⁷

Among all factors we investigated, parent's consumption was the strongest determinant of high SSB consumption; it was found to be significant across all the races, both genders and in 6–18 year olds. We only found no association between child and parent's SSB consumption in the youngest group (3–5 year olds). In a study of 8–13 year olds, children whose parents regularly consumed SSB were almost three times more likely to consume SSB 5 times per week compared to children of parents who were not regular consumers.¹⁴ Parental modeling has shown to have a key role in shaping child's eating behavior.²¹ It emphasizes the importance of the family environment and engaging parents as being critical for building effective behavior-change interventions.²² The lack of association in the youngest group may suggest that parental control overrides parental modelling during early years, yet it may increase the preference for restricted foods in later childhood, once those become more accessible for the child.²³

No study so far has reported on the effect of breakfast on SSB consumption in children. A study with adult participants from Texas showed that consuming breakfast <3 times vs. 3 times per week remained significantly associated with drinking 3 SSBs per day after adjusting for other unhealthy dietary behaviors.²⁴ If breakfast is consumed, it is less likely that items high in empty calories that are more readily available, convenient, and affordable, such as SSBs, are consumed. In our population, we found that regularly consuming breakfast was associated with lower SSB rather consistently across several subgroups in the stratified analysis, i.e., in non-Hispanic black and Hispanic children, 6–11 and 12–18 years of age, and in boys. Nonetheless, while breakfast consumption was a determinant of low SSB consumption among 6–18 year olds, interestingly, among the 3–5 year olds, it was associated with high consumption of SSBs. SSBs are sometimes consumed as part of a breakfast meal,²⁵ which may be the case in our 3–5 year olds, explaining the observed association.

Similarly, we found high levels of physical activity to be associated with high SSB consumption in 6–11 year olds, whereas amongst 12–18 years olds, high physical activity was a determinant of low SSB consumption. Other authors have reported that children who exercised less tended to consume more SSBs.¹¹ However, in SPAN, while soda consumption was positively associated with hours spent engaging in sedentary behaviors, and inversely associated with various indices of physical activity, the intake of non-carbonated flavored and sports beverages was positively associated with both sedentary and physical activity behaviors.⁹ Our 6–11 year olds consumed significantly higher proportion of fruit flavored and sport drinks compared to children 12–18 years ($p < 0.001$). These drinks have been marketed as healthy beverage options that support optimal physical activity performance, and may be the reason for the positive association between SSB and physical activity observed in this age group. In cross-sectional analyses of two large nationally representative high school student populations of 14–18 years of age 2010 NYPANS⁸ and 2009 Youth Risk Behavior Survey (YRBS),¹³ low physical activity was significantly associated with greater odds of moderate,^{8, 13} and with reduced odds of heavy SSB consumption.⁸ As a common sedentary behavior, moderate and high amounts of screen time (TV or computer time) were associated with greater SSB consumption only among Hispanics and children ages 6–11 years, respectively. In their 8–13 year old study population, Grimm et al. found that children viewing TV 3.5 hours or more a day were twice as likely to consume SSB five or more times

per week, after controlling for other determinants.¹⁴ In two nationally representative samples of older high school students (14–18 years of age), watching TV >2 h/d was significantly associated with greater odds of moderate (≥ 1 time/d)^{8, 13} as well as heavy SSB consumption (≥ 3 times/d).⁸ Playing video games and non-school related use of computer for >2 h/d was associated with similar increase in odds for higher SSB consumption.¹³

Our stratified analyses elucidate potentially vulnerable groups, and suggest target behaviors for building effective interventions addressing SSB consumption in this population. We find that 12–18 year olds, non-Hispanic black girls and Hispanic boys of any age, and older boys living in more acculturated English-speaking households may particularly benefit from such interventions. Although parent's SSB consumption pattern seemed to have an effect only in children 6 and older, the first years of a child's life, and even the prenatal period, may be optimal for influencing child's food preferences and dietary behavior.²³ The positive association between breakfast and SSB consumption in our youngest group further emphasizes the importance of early interventions and the key role for the family, as well as community environments such as kindergarten, advertising, and food industry. In our study population, screen time was significant only among Hispanics and children 6–11 years. These patterns could be indicative of differences in advertising exposure among youth from different racial/ethnic groups, with a recent report showing that food and beverage industry heavily targets Spanish-language TV.²⁶ The differential association between SSB intake and physical activity in the two older age groups can possibly be due to the high intake of fruit-flavored and sport drinks among 6 to 11 year olds compared to 12 to 18 year olds. Insights on these differential associations can be critical for developing tailored interventions for specific age, race/ethnicity, and gender groups.

A major strength of our study is the large sample of minority children from a wide age range and low-income communities, in which the SSB consumption is highly prevalent. Furthermore, this is the first study to date to simultaneously examine household-, parental- and child-level determinants of this behavior in underserved population groups. Nevertheless, the study is subject to some limitations. The cross-sectional nature of our study prevents us from drawing conclusions about causality in the observed associations. We enquired only about frequency, and not amount of consumption, which may have biased our estimates of SSB consumption, and led to misclassification of our participants based on intake. We relied on parent reports on frequency of children's consumption, which have been shown to compare well with adolescent's self-reports and parental 24 hour recalls,^{27, 28} but are prone to measurement errors dependent on age, gender, race, and income, and driven by social-desirability and parental perception of child's weight status.^{29, 30} Moreover, unhealthy food, such as SSB, are especially prone to misreporting.³⁰ It is hence plausible that some of the associations observed here might have been misestimated due to systematic measurement error associated with these characteristics.

Conclusions

We identified a number of household-, parental- and child-level determinants of SSB consumption, which varied by race, gender and age, in this racially-diverse, low-income child population, suggesting the need for tailored interventions for reducing SSB

consumption in different groups. Being 12–18 years of age, of non-Hispanic black race/ethnicity, a high fast food consumer, and having a parent with high SSB consumption were associated with high SSB consumption. Living in a non-English speaking household, having a parent with a higher education level, and routinely having breakfast were associated with lower SSB consumption. Our stratified analyses identify potentially at-risk groups and target behaviors by race/ethnicity, age, and gender for building effective interventions addressing SSB consumption in this low-income underserved population.

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Demographics and lifestyle characteristics by frequency of SSB consumption in 3–18 years old from the New Jersey Childhood Obesity Study (n=1403)

Table 1

Demographics and lifestyle characteristics	All n (%)	Frequency of SSB consumption (%)				P value ^d
		No consumption	>0 – <0.5 SSB per day	0.5 to <1 per day	1 to <2 per day	
	1403	8.1	32.7	14.2	22.0	23.0
Child's age						
3–5 years	279 (19.9)	13.2	42.1	11.5	18.0	15.2
6–11 years	511 (36.4)	8.0	35.0	15.7	20.2	21.1
12–18 years	613 (43.7)	5.6	24.9	14.0	26.1	29.4
Child's gender						
Male	717 (51.1)	7.7	29.7	14.2	21.3	27.1
Female	686 (48.9)	8.5	35.8	14.1	22.8	18.8
Child's race						
Non-Hispanic white	185 (13.2)	15.1	36.3	15.9	21.5	11.2
Non-Hispanic Black	565 (40.2)	6.4	27.7	11.5	22.1	32.3
Hispanic	603 (43.0)	6.8	37.0	16.5	23.2	16.5
Other	50 (3.6)	23.0	33.0	14.9	8.6	20.5
Non-English speaking households						
No	1026 (73.1)	8.8	29.5	10.9	22.8	28.0
Yes	377 (26.9)	6.2	41.6	23.3	19.8	9.0
Parent's Education						
Less than high school	266 (19.0)	3.6	31.0	12.2	23.1	30.1
High school	528 (37.6)	7.8	28.1	13.8	22.9	27.4
College or higher	609 (43.4)	10.6	37.9	15.5	20.7	15.3
Parent's SSB consumption						
Low (None or <1 time per week)	369 (26.3)	20.3	43.4	11.9	14.2	10.2
Moderate (1 to <7 times per week)	471 (33.6)	4.7	43.9	20.0	17.6	13.8
High (>7 times per week)	563 (40.1)	3.5	17.3	10.9	30.2	38.1

Demographics and lifestyle characteristics	All n (%)	Frequency of SSB consumption (%)					P value ^a
		No consumption	>0 – <0.5 SSB per day	0.5 to <1 per day	1 to <2 per day	2 per day	
Child's fast food consumption							
None (Never)	135 (9.6)	22.2	47.4	9.9	13.8	6.7	<0.0001
Moderate (< 2 times per week)	992 (70.7)	6.7	33.9	14.4	22.0	23.0	
High (≥ 2 times per week)	276 (19.7)	5.0	17.9	15.9	27.4	33.8	
Child's screen time, n (%)							
Low (0 to <2h per day)	556 (39.6)	10.9	37.8	13.4	20.5	17.4	0.009
Moderate (2h to < 4h per day)	617 (44.0)	6.3	31.3	15.1	23.4	23.9	
High (≥ 4h per day)	230 (16.3)	5.7	23.6	13.7	22.4	34.6	
Child's physical activity^b							
Low (Never or 1 day per week)	393 (28.0)	8.3	31.4	18.1	19.4	22.8	0.145
Moderate (2 to 5 days per week)	586 (41.8)	8.1	34.1	15.3	23.7	18.8	
Low (6 to 7 days per week)	424 (30.2)	8.0	32.0	9.1	22.3	28.6	
Child's breakfast consumption							
Low (Never to 2 days per week)	70 (5.0)	3.1	14.9	10.0	25.7	46.3	<0.0001
Moderate (3 to 5 days per week)	224 (16.0)	3.7	21.2	23.6	29.5	22.1	
High (6 to 7 days per week)	1109 (79.0)	9.1	35.6	13.1	20.7	21.5	

^aFrom a χ^2 test to examine differences in proportions between categories.

^bBeing physically active ≥ 60 min per day.

Table 2
Effects of demographics and lifestyle characteristics on the probability of SSB consumption in 3–18 years old from the New Jersey Childhood Obesity Study (n=1403)

Marginal effects from an ordered logit model.

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption					P-value ^d
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Child's age						
3–5 years	Ref	Ref	Ref	Ref	Ref	
6–11 years	-0.03 (-0.07, 0.01)	-0.05 (-0.10, <0.005)	0.002 (<-0.005, 0.01)	0.02 (<-0.005, 0.05)	0.05 (<-0.005, 0.11)	0.080
12–18 years	-0.06 (-0.10, -0.03)	-0.11 (-0.16, -0.005)	-0.002 (-0.01, 0.01)	0.04 (0.01, 0.08)	0.13 (0.07, 0.19)	<0.0001
Female (child)	0.02 (<-0.005, 0.04)	0.03 (-0.01, 0.06)	0.001 (<-0.005, <0.005)	-0.01 (-0.02, <0.005)	-0.03 (-0.08, 0.01)	0.110
Child's race						
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref	
Non-Hispanic Black	-0.04 (-0.07, -0.01)	-0.07 (-0.12, -0.02)	-0.001 (-0.01, <0.005)	0.03 (0.01, 0.06)	0.08 (0.02, 0.14)	0.010
Hispanic	-0.02 (-0.05, 0.01)	-0.03 (-0.08, 0.01)	0.001 (<-0.005, <0.005)	0.02 (-0.01, 0.04)	0.04 (-0.01, 0.09)	0.150
Other	0.05 (-0.06, 0.15)	0.05 (-0.03, 0.13)	-0.01 (-0.03, 0.01)	-0.03 (-0.10, 0.04)	-0.05 (-0.15, 0.04)	0.300
Non-English speaking households						
No	Ref	Ref	Ref	Ref	Ref	
Yes	0.03 (<0.005, 0.05)	0.05 (<0.005, 0.09)	0.001 (<-0.005, <0.005)	-0.02 (-0.04, <-0.005)	-0.05 (-0.10, <-0.005)	0.030
Parent's Education						
Less than high school	Ref	Ref	Ref	Ref	Ref	
High school	0.02 (<-0.005, 0.05)	0.05 (<-0.005, 0.11)	0.01 (<-0.005, 0.01)	-0.02 (-0.03, <-0.005)	-0.07 (-0.14, 0.01)	0.070
College or higher	0.05 (0.02, 0.07)	0.09 (0.03, 0.15)	0.01 (<-0.005, 0.02)	-0.03 (-0.05, -0.01)	-0.11 (-0.19, -0.03)	0.003
Parent's SSB consumption						
Low (None or <1 time per week)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times per week)	-0.07 (-0.11, -0.02)	-0.09 (-0.13, -0.04)	0.02 (<0.005, 0.04)	0.06 (0.03, 0.10)	0.07 (0.03, 0.11)	0.001
High (1 times per day)	-0.12 (-0.16, -0.08)	-0.26 (-0.32, -0.20)	-0.003 (-0.02, 0.02)	0.12 (0.08, 0.16)	0.26 (0.20, 0.32)	<0.0001
Child's fast food consumption						

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption						P-value ^a
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day		
None (Never) Moderate (< 2 times per week) High (> 2 times per week)	Ref	Ref	Ref	Ref	Ref	Ref	0.003 0.070
	-0.04 (-0.07, -0.01) -0.04 (-0.08, 0.003)	-0.07 (-0.11, -0.02) -0.06 (-0.12, 0.01)	0.0004 (<-0.005, 0.01) 0.001 (<-0.005, 0.01)	0.03 (-0.01, 0.06) 0.03 (<-0.005, 0.06)	0.08 (0.03, 0.12) 0.06 (-0.01, 0.14)		
	Ref	Ref	Ref	Ref	Ref		
Child's screen time Low (0 to < 2h per day) Moderate (2h to < 4h per day) High (> 4h per day)	Ref	Ref	Ref	Ref	Ref	Ref	0.200 0.220
	-0.02 (-0.04, 0.01) -0.02 (-0.05, 0.01)	-0.03 (-0.07, 0.01) -0.04 (-0.10, 0.02)	-0.001 (<-0.005, <0.005) -0.001 (-0.01, <0.001)	0.01 (-0.01, 0.03) 0.01 (-0.01, 0.04)	0.03 (-0.02, 0.08) 0.04 (-0.03, 0.11)		
	Ref	Ref	Ref	Ref	Ref		
Child's physical activity^b Low (Never or 1 day per week) Moderate (2 to 5 days per week) Low (6 to 7 days per week)	Ref	Ref	Ref	Ref	Ref	Ref	0.420 0.630
	0.01 (-0.01, 0.03) -0.01 (-0.03, 0.02)	0.02 (-0.02, 0.06) -0.01 (-0.06, 0.04)	0.001 (<-0.005, <0.005) -0.001 (<-0.005, <0.005)	-0.01 (-0.02, 0.01) 0.004 (-0.01, 0.02)	-0.02 (-0.07, 0.03) 0.01 (-0.04, 0.07)		
	Ref	Ref	Ref	Ref	Ref		
Child's breakfast consumption Low (Never to 2 days per week) Moderate (3 to 5 days per week) High (6 to 7 days per week)	Ref	Ref	Ref	Ref	Ref	Ref	0.010 0.001
	0.04 (0.01, 0.07) 0.05 (0.03, 0.08)	0.12 (0.04, 0.21) 0.14 (0.06, 0.23)	0.02 (<-0.005, 0.05) 0.02 (<-0.005, 0.05)	-0.02 (-0.03, <0.005) -0.03 (-0.04, -0.01)	-0.17 (-0.31, -0.03) -0.20 (-0.33, -0.06)		
	Ref	Ref	Ref	Ref	Ref		

^aP-value for the estimated coefficient in the ordered logit model.

^bBeing physically active ≥ 60 min per day.

Table 3
Effects of demographics and lifestyle characteristics on the probability of the frequency of SSB consumption by race/ethnicity in 3–18 years old from the New Jersey Childhood Obesity Study (n=1403)

^a. Marginal effects from an ordered logit model.

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption					P-value ^b
	No consumption	>0 – <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Non-Hispanic Whites (n=185)						
Child's age	Ref	Ref	Ref	Ref	Ref	
3–5 years	-0.18 (-0.31, -0.04)	-0.05 (-0.12, 0.01)	0.05 (<0.001, 0.09)	0.11 (0.03, 0.19)	0.08 (<-0.001, 0.15)	0.010
6–11 years	-0.21 (-0.33, -0.08)	-0.08 (-0.17, -0.001)	0.05 (<0.001, 0.10)	0.13 (0.05, 0.22)	0.10 (0.04, 0.17)	<0.0001
12–18 years						
Female (child)	0.01 (-0.07, 0.08)	0.004 (-0.06, 0.07)	-0.001 (-0.02, 0.01)	-0.004 (-0.06, 0.05)	-0.004 (-0.07, 0.06)	0.890
Non-English speaking households	Ref	Ref	Ref	Ref	Ref	
No						
Yes	0.03 (-0.08, 0.13)	0.02 (-0.05, 0.09)	-0.01 (-0.03, 0.02)	-0.02 (-0.10, 0.06)	-0.02 (-0.10, 0.05)	0.600
Parent's Education	Ref	Ref	Ref	Ref	Ref	
Less than high school						
High school	0.09 (-0.08, 0.25)	0.06 (-0.09, 0.22)	-0.01 (-0.04, 0.02)	-0.06 (-0.19, 0.06)	-0.07 (-0.25, 0.11)	0.360
College or higher	0.02 (-0.13, 0.16)	0.02 (-0.14, 0.17)	-0.001 (-0.01, 0.00)	-0.01 (-0.12, 0.10)	-0.02 (-0.20, 0.16)	0.840
Parent's SSB consumption	Ref	Ref	Ref	Ref	Ref	
Low (None or <1 time per wk)						
Moderate (1 to <7 times per wk)	-0.20 (-0.08, 0.25)	-0.15 (-0.29, -0.00)	0.08 (0.01, 0.15)	0.17 (0.06, 0.28)	0.09 (0.02, 0.17)	<0.0001
High (> 1 times per day)	-0.24 (-0.13, 0.16)	-0.25 (-0.45, -0.05)	0.06 (0.00, 0.13)	0.24 (0.10, 0.38)	0.19 (0.06, 0.31)	<0.0001
Child's fast food consumption	Ref	Ref	Ref	Ref	Ref	
None (Never)						
Moderate (< 2 times per wk)	-0.11 (-0.29, -0.10)	-0.06 (-0.13, 0.00)	0.03 (-0.04, 0.10)	0.08 (-0.04, 0.20)	0.06 (0.00, 0.12)	0.160
High (> 2 times per wk)	-0.13 (-0.33, -0.14)	-0.09 (-0.13, 0.00)	0.03 (-0.04, 0.11)	0.11 (-0.06, 0.27)	0.09 (-0.03, 0.20)	0.160

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption				P-value ^b
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	
Child's screen time	Ref	Ref	Ref	Ref	
Low (0 to < 2h per day)	-0.04 (-0.11, 0.04)	-0.03 (-0.08, 0.03)	0.01 (-0.01, 0.02)	0.03 (-0.03, 0.09)	0.370
Moderate (2h to < 4h per day)	-0.06 (-0.16, 0.04)	-0.05 (-0.16, 0.05)	0.01 (-0.01, 0.03)	0.05 (-0.04, 0.13)	0.290
High (> 4h per day)					
Child's physical activity[‡]	Ref	Ref	Ref	Ref	
Low (Never or 1 day per wk)	0.01 (-0.10, 0.12)	0.01 (-0.07, 0.08)	-0.002 (-0.02, 0.02)	-0.01 (-0.09, 0.07)	0.840
Moderate (2 to 5 days per wk)	-0.05 (-0.14, 0.05)	-0.04 (-0.13, 0.04)	0.01 (-0.01, 0.02)	0.04 (-0.04, 0.11)	0.350
Low (6 to 7 days per wk)					
Child's breakfast consumption	Ref	Ref	Ref	Ref	
Low (Never to 2 days per wk)	0.01 (-0.13, 0.14)	0.01 (-0.20, 0.22)	<-0.0001 (-0.00, 0.00)	-0.01 (-0.13, 0.12)	0.910
Moderate (3 to 5 days per wk)	0.07 (-0.07, 0.20)	0.07 (-0.13, 0.27)	-0.01 (-0.03, 0.01)	-0.06 (-0.18, 0.07)	0.420
High (6 to 7 days per wk)					
Non-Hispanic Blacks (n=565)					
Child's age	Ref	Ref	Ref	Ref	
3-5 years	0.002 (-0.05, 0.05)	0.003 (-0.09, 0.10)	0.0002 (-0.01, 0.01)	-0.001 (-0.03, 0.03)	0.950
6-11 years	-0.03 (-0.08, 0.01)	-0.09 (-0.19, 0.02)	-0.01 (-0.03, 0.00)	0.01 (-0.02, 0.04)	0.100
12-18 years					
Female (child)	0.02 (-0.01, 0.04)	0.03 (-0.02, 0.09)	0.004 (-0.00, 0.01)	-0.01 (-0.02, 0.01)	0.250
Non-English speaking households	Ref	Ref	Ref	Ref	
No	0.04 (-0.06, 0.15)	0.08 (-0.07, 0.22)	0.004 (-0.00, 0.01)	-0.02 (-0.09, 0.04)	0.320
Yes					
Parent's education	Ref	Ref	Ref	Ref	
Less than high school	0.03 (-0.00, 0.06)	0.10 (-0.01, 0.21)	0.02 (-0.01, 0.06)	0.004 (-0.03, 0.03)	0.090
High school	0.05 (0.01, 0.08)	0.14 (0.02, 0.26)	0.03 (-0.01, 0.07)	-0.01 (-0.04, 0.03)	0.030
College or higher					
Parent's SSB consumption					

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption					P-value ^b
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Low (None or <1 time per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times per wk)	-0.04 (-0.10, 0.03)	-0.06 (-0.14, 0.03)	0.004 (-0.01, 0.02)	0.03 (-0.02, 0.08)	0.06 (-0.03, 0.15)	0.210
High (< 1 times per day)	-0.09 (-0.15, -0.03)	-0.22 (-0.31, -0.13)	-0.02 (-0.05, 0.00)	0.06 (0.01, 0.11)	0.27 (0.16, 0.38)	<0.0001
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	
Moderate (< 2 times per wk)	-0.04 (-0.08, 0.00)	-0.09 (-0.16, -0.01)	-0.01 (-0.02, 0.00)	0.02 (-0.01, 0.05)	0.12 (0.02, 0.22)	0.020
High (< 2 times per wk)	-0.01 (-0.07, 0.04)	-0.02 (-0.11, 0.08)	-0.001 (-0.01, 0.00)	0.01 (-0.03, 0.04)	0.02 (-0.10, 0.14)	0.720
Screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	
Moderate (2h to < 4h per day)	-0.003 (-0.04, 0.03)	-0.01 (-0.08, 0.07)	-0.001 (-0.01, 0.01)	0.001 (-0.01, 0.02)	0.01 (-0.10, 0.11)	0.870
High (< 4h per day)	-0.01 (-0.05, 0.02)	-0.03 (-0.12, 0.06)	-0.004 (-0.02, 0.01)	0.01 (-0.01, 0.02)	0.05 (-0.08, 0.17)	0.470
Child's physical activity †						
Low (Never or 1 day per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (2 to 5 days per wk)	0.0002 (-0.03, 0.03)	0.001 (-0.07, 0.07)	<0.0001 (-0.01, 0.01)	<-0.0001 (-0.01, 0.01)	-0.001 (-0.10, 0.10)	0.990
Low (6 to 7 days per wk)	-0.0004 (-0.03, 0.03)	-0.001 (-0.07, 0.07)	-0.0001 (-0.01, 0.01)	0.0001 (-0.01, 0.01)	0.001 (-0.10, 0.10)	0.980
Child's breakfast consumption						
Low (Never to 2 days per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (3 to 5 days per wk)	0.06 (0.02, 0.10)	0.19 (0.08, 0.30)	0.05 (0.00, 0.09)	0.02 (-0.05, 0.09)	-0.32 (-0.54, -0.09)	0.010
High (6 to 7 days per wk)	0.05 (0.02, 0.08)	0.17 (0.06, 0.27)	0.05 (-0.00, 0.09)	0.03 (-0.04, 0.09)	-0.28 (-0.51, -0.06)	0.010
Hispanics (n=603)						
Child's age						
3-5 years	Ref	Ref	Ref	Ref	Ref	
6-11 years	-0.04 (-0.08, 0.00)	-0.07 (-0.13, -0.01)	0.01 (-0.00, 0.02)	0.04 (0.00, 0.08)	0.06 (0.00, 0.11)	0.030
12-18 years	-0.06 (-0.10, -0.01)	-0.11 (-0.17, -0.04)	0.01 (-0.00, 0.02)	0.06 (0.02, 0.10)	0.09 (0.03, 0.15)	0.002
Female (child)	0.01 (-0.01, -0.04)	0.03 (-0.02, 0.08)	-0.001 (-0.00, 0.00)	-0.02 (-0.04, 0.01)	-0.03 (-0.07, 0.02)	0.250
Non-English speaking households						

Demographics and lifestyle characteristics	Change in probability for each outcome by frequency of SSB consumption					P-value ^b
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
No	Ref	Ref	Ref	Ref	Ref	0.330
Yes	0.02 (-0.01, -0.04)	0.03 (-0.03, 0.10)	-0.001 (-0.00, 0.00)	-0.02 (-0.05, 0.02)	-0.03 (-0.09, 0.03)	
Parent's education						
Less than high school	Ref	Ref	Ref	Ref	Ref	0.210 0.004
High school	0.02 (-0.01, -0.04)	0.04 (-0.02, 0.11)	0.0003 (-0.00, 0.00)	-0.02 (-0.05, 0.01)	-0.04 (-0.10, 0.02)	
College or higher	0.05 (0.01, 0.09)	0.11 (0.03, 0.18)	-0.01 (-0.02, 0.00)	-0.06 (-0.10, -0.02)	-0.09 (-0.16, -0.03)	
Parent's SSB consumption						
Low (None or <1 time per wk)	Ref	Ref	Ref	Ref	Ref	0.020 <0.0001
Moderate (1 to <7 times per wk)	-0.06 (-0.11, -0.00)	-0.09 (-0.15, -0.02)	0.03 (-0.00, 0.06)	0.07 (0.02, 0.12)	0.04 (0.01, 0.08)	
High (1 times per day)	-0.11 (-0.16, -0.05)	-0.33 (-0.41, -0.24)	0.01 (-0.03, 0.05)	0.19 (0.12, 0.26)	0.24 (0.16, 0.31)	
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	0.180 0.020
Moderate (< 2 times per wk)	-0.02 (-0.06, 0.01)	-0.04 (-0.10, 0.02)	0.004 (-0.00, 0.01)	0.03 (-0.01, 0.06)	0.03 (-0.01, 0.08)	
High (2 times per wk)	-0.05 (-0.09, -0.01)	-0.12 (-0.22, -0.01)	0.003 (-0.01, 0.02)	0.06 (0.00, 0.11)	0.10 (0.01, 0.19)	
Child's screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	0.020 0.500
Moderate (2h to < 4h per day)	-0.03 (-0.06, -0.01)	-0.07 (-0.13, -0.01)	0.003 (-0.00, 0.01)	0.04 (0.00, 0.07)	0.06 (0.01, 0.11)	
High (4h per day)	-0.02 (-0.06, 0.03)	-0.03 (-0.14, 0.07)	0.003 (-0.00, 0.01)	0.02 (-0.04, 0.07)	0.03 (-0.06, 0.12)	
Child's physical activity^c						
Low (Never or 1 day per wk)	Ref	Ref	Ref	Ref	Ref	0.090 0.420
Moderate (2 to 5 days per wk)	0.02 (-0.00, 0.05)	0.05 (-0.01, 0.11)	-0.002 (-0.01, 0.00)	-0.03 (-0.05, 0.00)	-0.05 (-0.11, 0.01)	
Low (6 to 7 days per wk)	0.01 (-0.02, 0.04)	0.03 (-0.04, 0.10)	-0.0004 (-0.00, 0.00)	-0.01 (-0.05, 0.02)	-0.03 (-0.10, 0.04)	
Child's breakfast consumption						
Low (Never to 2 days per wk)	Ref	Ref	Ref	Ref	Ref	0.210 0.040
Moderate (3 to 5 days per wk)	0.03 (-0.01, 0.06)	0.10 (-0.05, 0.24)	0.01 (-0.02, 0.04)	-0.03 (-0.07, 0.01)	-0.10 (-0.26, 0.07)	
High (6 to 7 days per wk)	0.05 (0.01, 0.08)	0.14 (0.01, 0.27)	0.01 (-0.02, 0.04)	-0.05 (-0.09, -0.01)	-0.14 (-0.29, 0.01)	

β_2 Findings on other races (n=50) are not reported in this table.
 β_3 P-value for the estimated coefficient in the ordered logit model.
 β_4 Being physically active 60 min per day.

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Table 4
Effects of demographics and lifestyle characteristics on the probability of the frequency of SSB consumption by age group in 3–18 years old from the New Jersey Childhood Obesity Study (n=1403)

Marginal effects from an ordered logit model.

	Change in probability for each outcome by frequency of SSB consumption				P-value ^a	
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day		2 times per day
3–5 YEARS OF AGE (n=279)						
Female (child)	-0.02 (-0.09, 0.05)	-0.02 (-0.09, 0.05)	0.003 (-0.01, 0.01)	0.01 (-0.03, 0.06)	0.02 (-0.06, 0.10)	0.620
Child's race						
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref	
Non-Hispanic Black	-0.11 (-0.23, 0.02)	-0.13 (-0.25, 0.00)	0.02 (-0.01, 0.06)	0.09 (0.02, 0.19)	0.12 (<-0.005, 0.25)	0.060
Hispanic	-0.03 (-0.16, 0.11)	-0.01 (-0.09, 0.06)	0.01 (-0.03, 0.04)	0.02 (-0.07, 0.10)	0.02 (-0.06, 0.10)	0.700
Other	0.23 (-0.12, 0.57)	-0.03 (-0.21, 0.16)	-0.05 (-0.12, 0.02)	-0.09 (-0.18, 0.01)	-0.06 (-0.15, 0.02)	0.150
Non-English speaking households						
No	Ref	Ref	Ref	Ref	Ref	
Yes	0.02 (-0.06, 0.10)	0.02 (-0.06, 0.10)	-0.003 (-0.02, 0.01)	-0.01 (-0.08, 0.05)	-0.02 (-0.11, 0.07)	0.640
Parent's Education						
Less than high school	Ref	Ref	Ref	Ref	Ref	
High school	0.04 (-0.03, 0.12)	0.08 (-0.06, 0.21)	-0.001 (-0.02, 0.01)	-0.04 (-0.09, 0.02)	-0.08 (-0.24, 0.07)	0.260
College or higher	0.09 (0.01, 0.17)	0.12 (-0.02, 0.26)	-0.01 (-0.03, 0.01)	-0.07 (-0.14, <-0.005)	-0.13 (-0.29, 0.03)	0.060
Parent's SSB consumption						
Low (None or <1 time per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times per wk)	-0.03 (-0.15, 0.10)	-0.02 (-0.10, 0.06)	0.01 (-0.03, 0.04)	0.02 (-0.07, 0.10)	0.02 (-0.07, 0.11)	0.680
High (> 7 times per day)	-0.09 (-0.23, 0.05)	-0.11 (-0.23, 0.02)	0.02 (-0.03, 0.06)	0.07 (-0.03, 0.18)	0.11 (-0.02, 0.24)	0.150
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	
Moderate (< 2 times per wk)	-0.04 (-0.12, 0.05)	-0.04 (-0.12, 0.04)	0.01 (-0.01, 0.02)	0.03 (-0.04, 0.09)	0.04 (-0.05, 0.13)	0.360
High (> 2 times per wk)	-0.03 (-0.14, 0.09)	-0.02 (-0.13, 0.08)	0.01 (-0.02, 0.03)	0.02 (-0.06, 0.18)	0.03 (-0.09, 0.15)	0.660

	Change in probability for each outcome by frequency of SSB consumption				P-value ^g
	No consumption	>0 – <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	
Child's screen time					
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref
Moderate (2h to < 4h per day)	-0.02 (-0.09, 0.05)	-0.02 (-0.09, 0.06)	0.003 (-0.01, 0.02)	0.01 (-0.04, 0.06)	0.02 (-0.06, 0.10)
High (4h per day)	-0.02 (-0.15, -0.11)	-0.03 (-0.20, 0.14)	0.004 (-0.01, 0.02)	0.02 (-0.08, 0.12)	0.03 (-0.15, 0.21)
Child's physical activity[†]					
Low (Never or 1 day per wk)	Ref	Ref	Ref	Ref	Ref
Moderate (2 to 5 days per wk)	0.05 (-0.01, 0.12)	0.07 (-0.02, 0.16)	-0.01 (-0.02, 0.01)	-0.04 (-0.09, 0.01)	-0.08 (-0.18, 0.02)
Low (6 to 7 days per wk)	0.07 (-0.01, 0.14)	0.08 (-0.01, 0.17)	-0.01 (-0.03, 0.01)	-0.05 (-0.10, 0.01)	-0.09 (-0.19, 0.01)
Child's breakfast consumption					
Low (Never to 2 days per wk)	Ref	Ref	Ref	Ref	Ref
Moderate (3 to 5 days per wk)	-0.29 (-0.57, -0.02)	-0.12 (-0.30, 0.06)	0.06 (-0.01, 0.12)	0.15 (0.04, 0.27)	0.20 (0.06, 0.35)
High (6 to 7 days per wk)	-0.24 (-0.51, 0.03)	-0.04 (-0.15, 0.07)	0.05 (-0.01, 0.11)	0.11 (0.02, 0.20)	0.11 (0.04, 0.19)
6-11 YEARS OF AGE (n=511)					
Female (child)	0.03 (<0.005, 0.06)	0.05 (<0.005, 0.10)	-0.002 (-0.01, <0.005)	-0.02 (-0.04, <-0.005)	-0.06 (-0.12, <-0.005)
Child's race					
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref
Non-Hispanic Black	-0.02 (-0.07, 0.04)	-0.02 (-0.11, 0.06)	0.001 (-0.01, 0.01)	0.01 (-0.03, 0.05)	0.03 (-0.07, 0.12)
Hispanic	-0.02 (-0.08, 0.03)	-0.04 (-0.12, 0.05)	0.002 (-0.01, 0.01)	0.01 (-0.02, 0.05)	0.04 (-0.05, 0.14)
Other	0.01 (-0.12, 0.14)	0.01 (-0.15, 0.17)	-0.001 (-0.02, 0.02)	-0.003 (-0.08, 0.08)	-0.01 (-0.20, 0.18)
Non-English speaking households					
No	Ref	Ref	Ref	Ref	Ref
Yes	<0.0001 (-0.05, 0.05)	0.0001 (-0.08, 0.08)	<0.0001 (<-0.005, <0.005)	<-0.0001 (-0.03, 0.03)	-0.0001 (-0.09, 0.09)
Parent's education					
Less than high school	Ref	Ref	Ref	Ref	Ref
High school	0.03 (-0.01, 0.07)	0.04 (-0.03, 0.11)	-0.001 (-0.01, <0.005)	-0.02 (-0.04, 0.01)	-0.05 (-0.14, 0.04)
College or higher	0.01 (-0.03, 0.05)	0.02 (-0.06, 0.10)	<0.0001 (-0.00, <0.005)	-0.01 (-0.03, 0.02)	-0.02 (-0.12, 0.08)

	Change in probability for each outcome by frequency of SSB consumption					P-value ^g
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Parent's SSB consumption						
Low (None or <1 time per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times per wk)	-0.09 (-0.15, -0.03)	-0.10 (-0.16, -0.03)	0.05 (0.01, 0.09)	0.08 (0.03, 0.13)	0.06 (0.02, 0.09)	0.002
High (1 times per day)	-0.15 (-0.21, -0.09)	-0.37 (-0.47, -0.28)	0.02 (-0.02, 0.06)	0.19 (0.13, 0.25)	0.32 (0.22, 0.41)	<0.0001
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	
Moderate (< 2 times per wk)	-0.05 (-0.10, <0.005)	-0.07 (-0.12, -0.01)	0.01 (-0.01, 0.02)	0.03 (-0.01, 0.07)	0.08 (0.02, 0.15)	0.030
High (2 times per wk)	-0.04 (-0.10, 0.02)	-0.06 (-0.14, 0.03)	0.01 (-0.01, 0.02)	0.03 (-0.02, 0.07)	0.07 (-0.03, 0.15)	0.170
Child's screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	
Moderate (2h to < 4h per day)	-0.03 (-0.06, 0.01)	-0.05 (-0.11, 0.01)	0.003 (<-0.005, 0.01)	0.02 (-0.01, 0.05)	0.05 (-0.01, 0.11)	0.110
High (4h per day)	-0.06 (-0.10, -0.02)	-0.12 (-0.22, -0.02)	-0.002 (-0.02, 0.01)	0.04 (<0.005, 0.08)	0.14 (0.03, 0.25)	0.010
Child's physical activity[†]						
Low (Never or 1 day per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (2 to 5 days per wk)	-0.05 (-0.09, <0.005)	-0.06 (-0.13, <0.005)	0.01 (-0.01, 0.02)	0.03 (-0.00, 0.06)	0.07 (<0.005, 0.14)	0.040
Low (6 to 7 days per wk)	-0.06 (-0.11, -0.02)	-0.10 (-0.18, -0.03)	0.004 (-0.01, 0.02)	0.04 (<0.005, 0.08)	0.12 (0.05, 0.19)	0.002
Child's breakfast consumption						
Low (Never to 2 days per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (3 to 5 days per wk)	0.03 (<-0.005, 0.07)	0.12 (<-0.005, 0.24)	0.02 (-0.01, 0.05)	-0.02 (-0.04, 0.01)	-0.15 (-0.32, 0.01)	0.060
High (6 to 7 days per wk)	0.06 (0.03, 0.09)	0.17 (0.06, 0.28)	0.02 (-0.02, 0.05)	-0.03 (-0.06, -0.01)	-0.21 (-0.37, -0.06)	0.003
12-18 YEARS OF AGE (n=613)						
Female (child)	0.01 (-0.01, 0.03)	0.02 (-0.03, 0.07)	0.01 (-0.01, 0.01)	-0.004 (-0.02, 0.01)	-0.03 (-0.10, 0.04)	0.400
Child's race						
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref	
Non-Hispanic Black	-0.03 (-0.06, -0.01)	-0.09 (-0.15, -0.02)	-0.02 (-0.03, -0.00)	0.02 (<-0.005, 0.04)	0.12 (0.03, 0.21)	0.010
Hispanic	-0.01 (-0.04, 0.02)	-0.02 (-0.09, 0.04)	-0.003 (-0.01, 0.01)	0.01 (-0.02, 0.03)	0.03 (-0.06, 0.11)	0.500

	Change in probability for each outcome by frequency of SSB consumption					P-value ^a
	No consumption	>0 – <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Other	0.02 (-0.04, 0.07)	0.03 (-0.07, 0.13)	0.002 (<-0.005, 0.01)	-0.01 (-0.07, 0.04)	-0.04 (-0.15, 0.08)	0.550
Non-English speaking households						
No	Ref	Ref	Ref	Ref	Ref	
Yes	0.03 (<0.005, 0.06)	0.08 (0.01, 0.14)	0.01 (<0.005, 0.03)	-0.02 (-0.05, <0.005)	-0.10 (-0.18, -0.02)	0.020
Parent's education						
Less than high school	Ref	Ref	Ref	Ref	Ref	
High school	0.01 (-0.01, 0.03)	0.05 (-0.03, 0.12)	0.02 (-0.01, 0.04)	0.001 (-0.01, 0.01)	-0.08 (-0.20, 0.05)	0.240
College or higher	0.05 (0.02, 0.08)	0.14 (0.06, 0.22)	0.03 (<0.005, 0.06)	-0.03 (-0.06, <0.005)	-0.20 (-0.32, -0.07)	0.001
Parent's SSB consumption						
Low (None or <1 time per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times per wk)	-0.05 (-0.10, -0.01)	-0.12 (-0.20, -0.03)	-0.003 (-0.02, 0.01)	0.06 (0.01, 0.11)	0.11 (0.03, 0.19)	0.010
High (1 times per day)	-0.08 (-0.12, -0.04)	-0.23 (-0.32, -0.15)	-0.04 (-0.07, -0.02)	0.08 (0.02, 0.14)	0.28 (0.19, 0.37)	<0.0001
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	
Moderate (< 2 times per wk)	-0.03 (-0.06, <-0.005)	-0.07 (-0.13, -0.01)	-0.01 (-0.02, <-0.005)	0.02 (<-0.005, 0.05)	0.09 (0.01, 0.17)	0.030
High (2 times per wk)	-0.04 (-0.07, -0.01)	-0.10 (-0.18, -0.01)	-0.02 (-0.04, <0.005)	0.03 (<-0.005, 0.05)	0.13 (0.02, 0.24)	0.020
Child's screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	
Moderate (2h to < 4h per day)	-0.01 (-0.03, 0.02)	-0.02 (-0.07, 0.04)	-0.003 (-0.01, 0.01)	0.003 (-0.01, 0.01)	0.02 (-0.06, 0.10)	0.600
High (4h per day)	0.003 (-0.03, 0.03)	0.01 (-0.06, 0.07)	0.001 (-0.01, 0.01)	-0.001 (-0.02, 0.01)	-0.01 (-0.10, 0.09)	0.860
Child's physical activity^b						
Low (Never or 1 day per wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (2 to 5 days per wk)	0.02 (<0.005, 0.05)	0.06 (<0.005, 0.12)	0.01 (<-0.005, 0.03)	-0.01 (-0.03, <0.005)	-0.09 (-0.17, -0.01)	0.030
Low (6 to 7 days per wk)	0.01 (-0.02, 0.04)	0.03 (0.04, 0.10)	0.01 (-0.01, 0.03)	-0.003 (-0.01, 0.01)	-0.04 (-0.15, 0.06)	0.420
Child's breakfast consumption						
Low (Never to 2 days per wk)	Ref	Ref	Ref	Ref	Ref	

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	Change in probability for each outcome by frequency of SSB consumption					P-value ^d
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
Moderate (3 to 5 days per wk)	0.04 (0.01, 0.07)	0.13 (0.04, 0.22)	0.04 (<-0.005, 0.08)	0.001 (-0.04, 0.04)	-0.22 (-0.40, -0.04)	0.010
High (6 to 7 days per wk)	0.04 (0.01, 0.06)	0.12 (0.03, 0.20)	0.04 (<-0.005, 0.08)	0.01 (-0.03, 0.05)	-0.19 (-0.37, -0.02)	0.020

^dP-value for the estimated coefficient in the ordered logit model.

^bBeing physically active 60 min per day.

Table 5
Effects of demographics and lifestyle characteristics on the probability of the frequency of SSB consumption by gender in 3–18 years old from the New Jersey Childhood Obesity Study (n=1403)

Marginal effects from an ordered logit model.

	Change in probability for each outcome by frequency of SSB consumption					P-value ^a
	No consumption	>0 - <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
MALES (n=717)						
Child's age						
3–5 years	Ref	Ref	Ref	Ref	Ref	
6–11 years	-0.04 (-0.10, 0.01)	-0.07 (-0.14, 0.01)	-0.001 (-0.01, 0.01)	0.03 (-0.01, 0.07)	0.08 (-0.01, 0.17)	0.090
12–18 years	-0.07 (-0.12, -0.01)	-0.11 (-0.19, -0.04)	-0.01 (-0.02, <0.005)	0.04 (<0.005, 0.08)	0.14 (0.06, 0.23)	0.003
Child's race						
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref	
Non-Hispanic Black	-0.05 (-0.10, 0.01)	-0.07 (-0.14, <0.005)	-0.002 (-0.01, 0.01)	0.02 (-0.01, 0.06)	0.09 (<-0.005, 0.18)	0.060
Hispanic	-0.05 (-0.11, 0.01)	-0.08 (-0.15, -0.01)	-0.003 (-0.01, 0.01)	0.03 (-0.01, 0.07)	0.10 (0.01, 0.20)	0.040
Other	-0.01 (-0.11, 0.09)	-0.01 (-0.13, 0.11)	0.001 (-0.01, 0.01)	0.01 (-0.06, 0.07)	0.01 (-0.14, 0.16)	0.860
Non-English speaking households						
No	Ref	Ref	Ref	Ref	Ref	
Yes	0.09 (0.04, 0.14)	0.13 (0.07, 0.19)	0.001 (-0.01, 0.01)	-0.06 (-0.09, -0.02)	-0.16 (-0.27, -0.05)	<0.0001
Parent's Education						
Less than high school	Ref	Ref	Ref	Ref	Ref	
High school	0.02 (-0.01, 0.05)	0.05 (-0.01, 0.11)	0.01 (-0.01, 0.03)	-0.01 (-0.02, <0.005)	-0.07 (-0.17, 0.02)	0.130
College or higher	0.06 (0.02, 0.09)	0.12 (0.04, 0.19)	0.02 (<-0.005, 0.03)	-0.03 (-0.05, -0.01)	-0.16 (-0.27, -0.05)	0.002
Parent's SSB consumption						
Low (None or <1 time/wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (1 to <7 times/wk)	-0.04 (-0.09, 0.02)	-0.05 (-0.11, 0.02)	0.01 (-0.01, 0.02)	0.03 (-0.01, 0.07)	0.05 (-0.02, 0.11)	0.150
High (1 times per day)	-0.09 (-0.14, -0.04)	-0.20 (-0.28, -0.12)	-0.02 (-0.04, 0.01)	0.07 (0.03, 0.12)	0.23 (0.14, 0.32)	<0.0001
Child's fast food consumption						

	Change in probability for each outcome by frequency of SSB consumption					P-value ^g
	No consumption	>0 – <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
None (Never)	Ref	Ref	Ref	Ref	Ref	
Moderate (< 2 times per week)	-0.02 (-0.06, 0.02)	-0.04 (-0.10, 0.02)	-0.003 (-0.01, <0.005)	0.01 (-0.01, 0.03)	0.05 (-0.03, 0.13)	0.230
High (2 times per week)	0.004 (-0.05, 0.06)	0.01 (-0.08, 0.09)	0.0002 (<-0.0005, <0.0005)	-0.002 (-0.03, 0.03)	-0.01 (-0.12, 0.10)	0.890
Child's screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	
Moderate (2h to < 4h per day)	-0.02 (-0.05, 0.01)	-0.03 (-0.08, 0.02)	-0.003 (-0.01, <0.005)	0.01 (-0.01, 0.03)	0.04 (-0.03, 0.11)	0.270
High (4h per day)	-0.001 (-0.04, 0.04)	-0.002 (-0.07, 0.06)	-0.0001 (<-0.0005, <0.0005)	0.001 (-0.02, 0.02)	0.003 (-0.08, 0.09)	0.950
Child's physical activity^f						
Low (Never or 1 day/wk)	Ref	Ref	Ref	Ref	Ref	
Moderate (2 to 5 days/wk)	0.01 (-0.03, 0.04)	0.01 (-0.04, 0.07)	0.001 (<-0.0005, <0.0005)	-0.004 (-0.02, 0.02)	-0.01 (-0.09, 0.06)	0.710
Low (6 to 7 days per week)	-0.03 (-0.06, 0.01)	-0.05 (-0.11, 0.01)	-0.01 (-0.02, <0.0005)	0.01 (-0.01, 0.03)	0.07 (-0.02, 0.15)	0.110
Child's breakfast consumption						
Low (Never to 2 days per week)	Ref	Ref	Ref	Ref	Ref	
Moderate (3 to 5 days per week)	0.04 (0.01, 0.07)	0.13 (0.04, 0.22)	0.05 (<-0.0005, 0.09)	0.02 (-0.03, 0.06)	-0.23 (-0.41, -0.05)	0.010
High (6 to 7 days per week)	0.07 (0.04, 0.09)	0.19 (0.10, 0.27)	0.05 (-0.01, 0.10)	0.001 (-0.04, 0.05)	-0.31 (-0.48, -0.13)	<0.0001
FEMALES (n=686)						
Child's age						
3–5 years	Ref	Ref	Ref	Ref	Ref	
6–11 years	-0.02 (-0.06, 0.03)	-0.02 (-0.08, 0.03)	0.002 (-0.01, 0.01)	0.01 (-0.02, 0.05)	0.02 (-0.03, 0.07)	0.450
12–18 years	-0.06 (-0.11, -0.01)	-0.11 (-0.18, -0.03)	0.001 (-0.01, 0.01)	0.05 (0.01, 0.10)	0.11 (0.03, 0.19)	0.010
Child's race						
Non-Hispanic white	Ref	Ref	Ref	Ref	Ref	
Non-Hispanic Black	-0.05 (-0.08, -0.01)	-0.08 (-0.15, -0.01)	0.001 (-0.01, 0.01)	0.04 (0.00, 0.08)	0.08 (0.01, 0.15)	0.020
Hispanic	-0.02 (-0.06, 0.02)	-0.02 (-0.08, 0.03)	0.002 (-0.00, 0.01)	0.01 (-0.02, 0.05)	0.02 (-0.03, 0.08)	0.420
Other	0.09 (-0.06, 0.23)	0.07 (-0.00, 0.14)	-0.02 (-0.06, 0.02)	-0.06 (-0.16, 0.03)	-0.07 (-0.15, 0.01)	0.180
Non-English speaking households						

	Change in probability for each outcome by frequency of SSB consumption					P-value ^a
	No consumption	>0 – <0.5 time per day	0.5 to <1 time per day	1 to <2 times per day	2 times per day	
No	Ref	Ref	Ref	Ref	Ref	0.780
Yes	-0.01 (-0.04, 0.03)	-0.01 (-0.06, 0.05)	<0.0001 (<-0.005, <0.005)	0.004 (-0.02, 0.03)	0.01 (-0.05, 0.07)	
Parent's education						
Less than high school	Ref	Ref	Ref	Ref	Ref	0.190
High school	0.03 (-0.01, 0.06)	0.05 (-0.03, 0.13)	0.002 (-0.01, 0.01)	-0.02 (-0.05, 0.01)	-0.06 (-0.16, 0.04)	
College or higher	0.04 (-0.00, 0.08)	0.07 (-0.01, 0.16)	0.001 (-0.01, 0.01)	-0.03 (-0.06, <0.005)	-0.08 (-0.18, 0.02)	0.090
Parent's SSB consumption						
Low (None or <1 time per week)	Ref	Ref	Ref	Ref	Ref	<0.0001
Moderate (1 to <7 times per week)	-0.10 (-0.15, -0.04)	-0.11 (-0.17, -0.05)	0.04 (0.01, 0.07)	0.10 (0.04, 0.15)	0.07 (0.03, 0.12)	
High (1 times per day)	-0.15 (-0.21, -0.09)	-0.32 (-0.41, -0.24)	0.01 (-0.02, 0.04)	0.19 (0.11, 0.26)	0.28 (0.20, 0.35)	
Child's fast food consumption						
None (Never)	Ref	Ref	Ref	Ref	Ref	0.001
Moderate (< 2 times per week)	-0.07 (-0.11, -0.02)	-0.09 (-0.14, -0.04)	0.01 (<-0.005, 0.02)	0.06 (0.02, 0.09)	0.09 (0.04, 0.14)	
High (2 times per week)	-0.07 (-0.12, -0.02)	-0.10 (-0.18, -0.02)	0.01 (<-0.005, 0.02)	0.06 (0.02, 0.11)	0.10 (0.02, 0.18)	
Child's screen time						
Low (0 to < 2h per day)	Ref	Ref	Ref	Ref	Ref	0.470
Moderate (2h to < 4h per day)	-0.01 (-0.04, 0.02)	-0.02 (-0.07, 0.03)	0.001 (<-0.005, <0.005)	0.01 (-0.02, 0.04)	0.02 (-0.03, 0.07)	
High (4h per day)	-0.04 (-0.08, <0.005)	-0.07 (-0.16, 0.02)	-0.002 (-0.01, 0.01)	0.03 (-0.01, 0.07)	0.08 (-0.02, 0.18)	
Child's physical activity^b						
Low (Never or 1 day per week)	Ref	Ref	Ref	Ref	Ref	0.470
Moderate (2 to 5 days per week)	0.01 (-0.02, 0.04)	0.02 (-0.03, 0.07)	<0.0001 (<-0.005, <0.005)	-0.01 (-0.03, 0.02)	-0.02 (-0.08, 0.04)	
Low (6 to 7 days per week)	0.02 (-0.02, 0.05)	0.03 (-0.04, 0.09)	-0.0002 (<-0.005, <0.005)	-0.01 (-0.05, 0.02)	-0.03 (-0.10, 0.04)	
Child's breakfast consumption						
Low (Never to 2 days per week)	Ref	Ref	Ref	Ref	Ref	0.270
Moderate (3 to 5 days per week)	0.03 (-0.02, 0.09)	0.07 (-0.06, 0.19)	0.003 (-0.01, 0.02)	-0.03 (-0.07, 0.01)	-0.08 (-0.23, 0.07)	
High (6 to 7 days per week)	0.03 (-0.02, 0.08)	0.06 (-0.06, 0.18)	0.003 (-0.01, 0.02)	-0.02 (-0.06, 0.01)	-0.07 (-0.22, 0.07)	

q p -value for the estimated coefficient in the ordered logit model.

Being physically active 60 min per day.

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