Social Determinants of Health and the Prevalence of Overweight Status and Mental Health Conditions Among Non-Hispanic Black and Hispanic Children in the United States

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Abstract

Purpose: A growing concern in the United States has been the rise of anxiety and depression and its relation to excessive weight status among non-Hispanic Black and Hispanic children, racial groups with higher-than-average rates of overweight status and obesity. This study explored this prevalence by analyzing individual, interpersonal, and community factors among this population. The study also sought to determine if a correlation exists between elevated weight and mental health issues in the study population.

Methods: Using data from the 2017's National Survey of Children Health (NSCH), the prevalence of anxiety and depression was investigated among Black and Hispanic children ages 10-17 years old with a BMI greater than the 85th percentile, defined by the CDC as being overweight/obese (N=10,839).

Results: Two-way chi square tests were conducted in SPSS, determining that statistically significant correlates ($p < 0.05$) existed between the prevalence of overweight/obesity in children and individual, interpersonal, and community factors, with the most significant correlates being individual factors. A significant correlate was found to exist between overweight/obesity and the prevalence of anxiety and depression ($p < 0.05$, for both); however, when categorized by either race, no significant correlate was observed ($p = 0.40, 0.26$). Using a simple linear regression model, the most significant variables that correlated with overweight/obese were age, Mental Health Index, Adverse Childhood Experiences (ACE) score, and *Family Received Assistance in*

Last 12 Months. Family Received Assistance in Last 12 Months was indicated as a question on the NCSH.

Conclusion: The results of the study found the most significant correlates to be between individual factors and overweight/obesity in children. The multiple logistic regression model demonstrated that only three variables were significant predictors of overweight/obesity in children after running stepwise selection. Additional studies investigating mental health (MH) and behavioral health factors among children who are overweight or obese (o/o) is recommended.

Purpose

Increased rates of childhood overweight and obesity status has been a public health issue in the United States for the past decade, as it is a comorbidity of multiple, preventable diseases (Bhadoria et al., 2015; Mannan et al., 2016). In 2019, the Centers for Disease Control and Prevention (CDC) estimated that 18.5% of children in the United States were obese. Childhood obesity is most common in Hispanic (25.8%) and non-Hispanic Black children (22.0%) while non-Hispanic, upper class White children were cited to have the least prevalence of childhood obesity (CDC, 2019)[1].

A national effort to reduce racial and ethnic disparities, including education, income, location, and other social factors, can be exhibited in the establishment of the Racial and Ethnic Approach to Community Health (REACH) program (CDC, 2020). This program is focused on reducing health disparities in specific ethnic and racial groups of communities with high rates of chronic diseases, such as obesity, through a variety of means, including support for tobacco free living and providing more healthy nutrition options. According to the literature, obesity intervention and prevention strategies that use behavioral components, such as dietary and physical activity behaviors, are effective strategies towards weight loss (Ewart-Pierce et al., 2016; Castillo et al., 2015; Gariepy et al., 2009).Within the framework of targeting behavior to address childhood obesity, considerations include community, interpersonal, and individual factors (Loring & Robertson, 2014; CDC, 2019). Prominent individual factors associated with

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[1] "Obese," "overweight," "healthy weight," and "underweight" are defined by the CDC in terms of Body Mass Index (BMI) quartile percentages in age and sex-specific growth charts. Obese is at or greater than the 95th percentile, overweight is between the 85th and 94th percentiles, "healthy weight is between the 5th and 84th percentile, and underweight is at or less than the 5th percentile ("Childhood," 2020).

childhood obesity include mental health factors such as anxiety and depression (Rankin et al.,

2016).

A more recent concern among public and pediatric health is the increasing rates of

anxiety and depression among children (CDC, 2020; Bitsko et al., 2018). According to data from

the CDC, family, community, and healthcare factors are related to children's mental health

status. Common mental health disorders that have been diagnosed in children include attention-

deficit/hyperactivity disorder (ADHD), anxiety, and behavior disorders. Additionally, among

children living below 100% of the federal poverty level, more than 1 in 5 (22%) were found to

have a mental, behavioral, or developmental disorder (CDC, 2020). Few studies have

investigated mental health and obesity prevalence among non-White children in the framework

of social determinants of health. This study further investigated this association to contribute to

the narrative surrounding health disparities and inequities in health-vulnerable communities.

Objective

This study aims to investigate if significant correlates exist between the prevalence of

overweight status and obesity in children among individual, interpersonal, and community

factors in the social determinants of health model. Additionally, the study aims to investigate if a

significant correlate exists between the prevalence of overweight and obesity and anxiety or

depression among Non-Hispanic African American and Hispanic children.

Hypothesis

There will be a significant difference in the prevalence of overweight status and obesity

in children among individual, interpersonal, and community factors within the social

determinants of health framework. Additionally, it is hypothesized that there will be a significant

difference in the prevalence of mental health factors such as anxiety and depression in Non-

Hispanic African American and Hispanic overweight and obese children as compared to children who are not who are not overweight or obese.

Methods

Data from the 2017 National Survey of Children's Health (NSCH) was used for this study[2]. The population examined were children aged 10-17 years old who were overweight or obese (N = 10,839). Data was analyzed using IBM SPSS Statistics (Version 26) predictive analytics software (IBM, 2019).

Independent variables were selected and coded into a Mental Health Index (MH Index) and race. The MH Index was calculated by the addition of *"ever having had anxiety or depression".* The question for MH Index asked if the child had ever had depression and anxiety. The question pertaining to race asked what race the child was. Responses for MH Index were *none reported mental health issue*s, *one reported mental health issue*, and *reported mental health issues.* Responses for race included *Hispanic*, *White non-Hispanic*, *Black non-Hispanic*, and *Other/Multi-Racial Non-Hispanic*.

Dependent variables for individual, interpersonal, and community factors were selected and coded by weight status. The question was *"What is the current weight of the child?"* with responses as *Underweight*, *Healthy Weight*, and *Overweight* or *Obese*. Simple descriptive statistics including frequencies and percentages were conducted for the primary independent variable of MH Index and race and the dependent variables of weight status as grouped by

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[2] The National Survey of Children's Health is sponsored by the Health Resources and Services Administration's (HRSA) Maternal and Child Health Bureau (MCHB) under the U.S. Department of Health and Human Services (HHS). The survey provides detailed data regarding health, well-being, and access to amenities for non-institutionalized children, ages 0-17 years (2018).

children ages 10-17. Chi square tests were performed on weight status and MH Index as filtered by race and age of child.

A simple logistic regression method was performed individually, which included odds ratios and confidence intervals for various independent variables such as race, gender, and other index scores. The dependent variable, weight status, was dichotomized as underweight or normal weight (0) and obese or overweight (1) and weight status was filtered as equal to obese or overweight as grouped by children ages 10-17. A multiple logistic regression method including odds ratios and confidence intervals was performed for MH Index, ACE score, and *family receiving assistance within the last 12 months* as our independent variables simultaneously via stepwise selection to determine the significant predictors for obese or overweight weight status as grouped by children ages 10-17. The ACE score was a composite of adverse childhood experiences measured by parental divorces, deaths, a parent being in jail, and discrimination, which could lead to anxiety or depression among children. Families receiving assistance within the last 12 months were chosen as a variable due to access to food stamps and other programs has been shown to improve nutritional access and affect obesity rates.

Results

Individual factors of social determinants of health that were tested for significant associations (n=20) with prevalence of overweight or obese children aged 10-17 included anxiety, behavioral problems, depression, emotional support for parents (counselor, health care provider, (peer) support group, family and friends, place of worship, intellectual disability, learning disability, race/ethnicity, and sex of child (Table 1). Interpersonal factors (n=8) of social determinants of health that were tested for significant associations with the prevalence of overweight or obese children (ages 10-17) included, hard to cover basics such as food and

housing, ACE (parents divorced or separated), food stamp recipient in the past 12 months,

mental health status of mother, ACE (parent died), ACE (parent in jail), ACE (discrimination),

and anyone in house uses cigarettes (Table 1). Community factors (n=3) of social determinants

of health that were tested for a significant association with the prevalence of overweight or obese

children (ages 10-17) were community participation, safe neighborhood, and safe school (Table

1).

Table 1: Significant Associations between Individual, Interpersonal, and Community Factors and BMI > 85th Percentile in Children, ages 10-17

Individual Factors	p-value
Anxiety	0.000
Anxiety Currently	0.000
Autism – ASD	0.000
Behavioral Problems (previously)	0.000
Behavioral Problems (currently)	0.000
Depression (previously)	0.000
Depression (currently)	0.000
Emotional Support – Counselor	0.001
Emotional Support - Health Care Provider	0.011
Emotional Support - Support Group	0.000
Emotional Support – Other	0.000
Emotional Support - Family, or Friend	0.001
Emotional Support - Peer Support Group	0.011
Emotional Support - Place of Worship	0.015
Emotional Support – Spouse	0.000

Intellectual Disability	0.000
Learning Disability (previous)	0.000
Learning Disability (currently)	0.000
Race/Ethnicity	0.000
Sex of the selected child	0.000
Interpersonal Factors	**p-value**
Hard to cover basics like food and housing	0.000
ACE (i.e. parents divorced or separated)	0.000
Food stamp recipient past 12 months	0.000
Mental health status of mother	0.000
ACE (i.e. parent died)	0.000
ACE (i.e. parent in jail	0.000
ACE (i.e. discrimination)	0.037
Anyone in house uses cigarettes	0.000
Community Factors	**p-value**
Community Participation	0.000
Safe neighborhood	0.000
Safe school	0.000

At the national level, out of 10,839 children, 6.4% were found to be underweight, 66.2% were of healthy weight, and 27.4% were found to be obese (Table 2). Within the children found to be overweight or obese, 11.1% were Hispanic, 69.4% were non-Hispanic White, 6.9% were non-Hispanic Black, and 12.6% were other multi-racial or non-Of the 10,839 children (N), 6.1% noted ever having anxiety and depression and 10.2% indicated ever having either anxiety or

depression. In the MH Index, the responses consisted of no reported mental health issues, one reported mental health issue, and more than one reported mental health issue. Of the 10,839 responses, 83.7% reported having no mental health issue, 10.2% reported having one mental health issue, and 6.1% reported having more than one mental health issue. Hispanics.

Table 2: Frequencies of MH Index, Race, and Weight Status Among non-Hispanic Black and Hispanic Children[2]

Variable	Responses	n (%)
MH Index[1]	No reported mental health issues	11256 (83.7)
	One reported mental health issue	11256 (10.2%)
	Two reported mental health issues	11256 (6.1%)
Race	Hispanic	10839 (11/1%)
	White non-Hispanic	100839 (69.4%)
	Black non-Hispanic	10839 (6.9%)
	Other /Multi-Racial Non-Hispanic	10839 (12.6%)
Weight Status	Underweight = <5th Percentile	11315 (6.4%)
	5th to 84th Percentile=Healthy Weight	11315 (66.2%)
	85th Percentile or Above=Overweight or Obese	11315 (27.4%)

Note:

1: Mental health index composite of two variables (ever had or currently has anxiety and depression)

[2] Percentages in table may not add up to 100% due to missing data.

A two-way chi-square value of 5.233 ($p = 0.05$) statistical test was then used to investigate the correlation between obesity and anxiety and obesity and depression in Hispanic children. A two-way chi square value of 4.021 ($p=0.05$) statistical test was also used to investigate the correlation between obesity and anxiety and obesity and depression in African American children. The p-values for both the Hispanic and non-Hispanic African American populations indicated that a significant association did not exist ($p > 0.05$) (Table 3). All p-

values were greater than the accepted p-value ($p > 0.05$), indicating that there was not a significant correlation between these variables. Using data from the 2017's NSCH, statistically significant associations were identified between the prevalence of childhood obesity and individual, interpersonal, and community factors via a two-way chi-square statistical test (X^2_{1-9}, CI 95%, $p < 0.05$) (Table 3).

Table 3: Chi Square Results of Association between MH Index and Weight Status Among non-Hispanic Black and Hispanic Children

Variable	Responses	X^2 (p-value)
Race	Hispanic	5.233 (0.264)
	African American	4.021 (0.403)

Note:
Not shown: MH Index and Weight Status as variables were filtered by race but are included in p-value

Using descriptive statistics, the study scope was expanded by including individual factors along with age and race. The total surveyed population was broken down into subgroups or representative samples based on each variable to gain a better, more comparable collection of responses. Of 2,968 children, 100% were ages 10-17 years old. Of 1,678 children, 56.5% were male. Of 1,290 children, 43.5% were female. Of 417 children, 14% were Hispanic. Of 1,926 children, 64.9% were white non-Hispanic. Of 285 children, 9.6% were black non-Hispanic. Of 316 children, 10.6% were other, multi-racial, non-Hispanics. Of 2,380 children, 80.2% noted never ever having had a mental health issue. Of 307 children, 10.3% noted having at least one mental health issue. Of 266 children, 9% reported having had more than one mental health issue. Of 251 children, 8.5% reported never having had a behavioral health issue. Of 2,344 children, 79% reported having had at least one behavioral health issue. Of 233 children, 7.9% reported having ever had more than one behavioral health issue. Of 2,490 children, 84.9% reported no developmental disability. Of 306 children, 10.4% reported having had at least one

developmental disability. Of 112 children, 3.8% reported having had more than one

developmental disability. Of 1,995 children, 67.2% reported having no difficulty keeping or

making friends in the past 12 months. Of 693 children, 23.3% reported having a little difficulty

keeping or making friends in the last 12 months. Of 252 children, 8.5% reported having a lot of

difficulty keeping or making friends in the last 12 months. Of 248 children, 8.4% reported no

emotional support. Of 961 children, 43.4% reported having emotional support (Table 4).

Table 4: Descriptive Statistics for Individual Factors of Obese and Overweight Children, aged 10-17[5]

Individual Factors	Responses	Frequency (%) Mean (SD)
Gender of Study Child	Male	1678 (56.5)
	Female	1290 (43.5)
Race	Hispanic	417 (14.0)
	White Non-Hispanic	1926 (64.9)
	Black Non-Hispanic	285 (9.6)
	Other/Multi-Racial Non-Hispanic	316 (10.6)
Mental Health Index[1]	No Mental Health Issues	2380 (80.2)
	One Mental Health Issue	307 (10.3)
	Two Mental Health Issues	266 (9.0)
Behavioral Health Index[2]	No Behavioral Health Issues	251 (8.5)
	One Behavioral Health Issue	2344 (79.0)
	Two Behavioral Health Issues	233 (7.9)

Developmental Disability Index[3]	No Developmental Disabilities	2490 (84.9)
	One Developmental Disability	306 (10.4)
	Two Developmental Disabilities	112 (3.8)
Difficulty Keeping or Making Friends in the Past 12 Months	No difficulty	1995 (67.2)
	A little difficulty	693 (23.3)
	A lot of difficulty	252 (8.5)
Parenting Emotional Support[4]	No emotional support	248 (8.4)
	Emotional support	961 (43.4)

Note: weight-status was defined as overweight and obese.
1: Mental Health Index was a composite of: two variables if the study child had ever had or has depression or anxiety.
2: Behavioral Health Index was a composite of: two variables of children currently have behavioral or conduct problems – age 3-17 years and ADD/ADHD ever.
3: Developmental Disability Index was a composite of: ASD ever, intellectual disability ever, and learning disability.
4. Parental emotional support included: spouse, family or close friend, health care provider, place of worship or religious leader, specific condition support group, peer support group, mental health professional, and other.
[5] Percentages in table may not add up to 100% due to missing data.

Using a logistic regression model, odds ratios was determined for each of the individual

factors along with age and race. A significant relationship was not found between children aged

10 years and older and weight status (85th percentile) due to the odds ratio was within the

confidence interval. The odds of male children being overweight or obese was 2.35 times as

likely compared to females. Of the children aged 10-17 years old, the odds of Hispanic, non-

Hispanic White, and non-Hispanic Black children being obese or overweight were 0.956 times

more likely as compared to other multi-racial children. Of the children aged 10-17 years old, the

odds of ever having had no mental health issue or one mental health issue were 1.30 times as

likely compared to having had more than one mental health issue. Of the children aged 10-17

years old, the odds of ever having had no behavioral health issue or one behavioral health issue

were 1.211 times as likely compared to having had more than one behavioral health issue. Of

the children aged 10-17 years old, the odds of ever having had no or one developmental

disability were 1.396 times as likely compared to ever having had more than one developmental

disability. Of the children aged 10-17 years old, the odds of having no or a little difficulty

making or keeping friends within the past 12 months was 0.997 as likely compared to having a

lot of difficulty making or keeping friends. Of the children aged 10-17 years old, the odds of no

emotional support were 0.997 times as likely compared to having emotional support (Table 5).

Table 5: Simple Logistic Regression for Individual Factors related to obesity in non-Hispanic Black and Hispanic Children, ages 10-17

BMI Obese or Overweight BMI %ile (ref: 1)	
Individual Factors	**OR (95% CI)**
Age of Child (years)	0.953 (0.936,0.971)
Gender of Study Child	
Male vs Female	2.35 (1.23,3.44)*
Race	0.956 (0.906,1.009)*
Hispanic	
White Non-Hispanic	
Black Non-Hispanic	
Other/Multi-Racial Non-Hispanic[R]	
Mental Health Index[1]	1.30 (1.208,1.399)*
No Mental Health Issues	
One Mental Health Issue	
Two Mental Health Issues[R]	
Behavioral Health Index[2]	1.211 (1.126,1.302)*
No Behavioral Health Issues	
One Behavioral Health Issue	
Two Behavioral Health Issues[R]	

Developmental Disability Index[3]
    No Developmental Disabilities
    One Developmental Disability
    Two Developmental Disabilities[R]
	1.396 (1.283,1.518)*

Difficulty Keeping or Making Friends in the Past   12 Months
 	
    No difficulty
 	
    A little difficulty
 	
    A lot of difficulty[R]
	0.997 (0.993,1.001)*

Parenting Emotional Support
 	
    No emotional support
 	
    Emotional support[R]
	0.997 (0.954,1.043)*

1: Mental Health Index was a composite of two variables if the study child had ever had depression or anxiety.

2: Behavioral Health Index: was a composite of two variables if the children currently have behavioral or conduct problems, age 3-17 years and ADD / ADHD Ever.

3: Developmental Disability Index: was a composite of three variables ASD Ever, intellectual disability ever, and learning disability.

R: Reference Group

* p<0.05, **p<0.01, ***p<0.001

Using descriptive statistics, the study scope was expanded by including interpersonal factors along with age and race. The total surveyed population was broken down into subgroups or representative samples to gain a better, more comparable collection of responses. Of 220 children, 7.4% reported definitely being bullied, picked on, or excluded by others. Of 683 children, 23% reported being somewhat bullied, picked on, or excluded by others. Of 2,035 children, 68.6% reported never being bullied, picked on, or excluded by others. Of 1,251 children, 42.8% reported no adverse childhood experience. Of 772 children, 26.4% reported having one adverse childhood experience. Of 902 children, 30.8% reported having two or more adverse childhood experiences. Of 551 children, 19.2% reported that the family received assistance in the last 12 months. Of 1,919 children, 67% reported that their family received no assistance in the last 12 months. Of 1,845 children, 62.2% reported that the mental health status of the mother was excellent or very good. Of 737 children, 24.8% reported that the mental

health status of the mother was good, fair, or poor. Of 474 children, 82.7% reported no tobacco

use in the house. Of 99 children, 17.3% reported tobacco use in the house (Table 6).

Table 6: Descriptive Statistics for Interpersonal Factors of Obese and Overweight Children, ages 10-17[3]

Variable	Variable	Variable
Interpersonal Factors		**Frequency (%)**
Bulled, Picked-on, or Excluded by Others	Definitely true Somewhat true Not true	220 (7.4) 683 (23.0) 2035 (68.6)
ACE Score[5]	Child Experienced 0 ACEs Child Experienced 1 ACE Child Experienced $\geq$ 2 ACEs	1251 (42.8) 772 (26.4) 902 (30.8)
Family Received Assistance in Last 12 Months[6]	Assistance No assistance	551 (19.2) 1919 (67)
Mental Health Status of Mother	Excellent or very good Good, fair or poor	1845 (62.2) 737 (24.8)
Tobacco Use in House	No tobacco use Tobacco use	474 (82.7) 99 (17.3)

Note:

[3]Percentages in table may not add up to 100% due to missing data.

5. (ACEs) Adverse Childhood Experiences

Child Experienced: Hard to Cover Basics Like Food or Housing, Parent or Guardian Divorced, Parent or Guardian Died, Parent or Guardian Time in Jail, Adults Slap, Hit, Kick, Punch Others, Victim of Violence, Lived with Mentally Ill Person, Lived with Person with Alcohol/Drug Problem, Treated Unfairly Because of Race)

6. Family received assistance in the past 12 months included: food stamps, WIC, cash, and free or reduced lunch.

Using a logistic regression model, an odds ratio was determined for each of the

interpersonal factors along with age and race. A significant relationship was not found between

children ages 10-17 years old being bullied, picked on, or excluded by others and being obese or

overweight due to the odds ratio being within the confidence interval. A significant was not

found between children ages 10-17 years old having had an adverse childhood experience and

being obese or overweight due to the odds ratio being within the confidence interval. Of the children ages 10-17 years old, the odds of the family receiving assistance was 1.473 times as likely as having received no assistance. Of the children ages 10-17 years old, the odds of the mental health status of the mother being excellent or good was 1.426 times as likely compared to being good, fair, or poor (Table 7).

Table 7: Simple Logistic Regression for Interpersonal Factors related to Obesity in Non-Hispanic Black and Hispanic Children, Aged 10-17

BMI Obese or Overweight BMI %ile (ref: 1)	
Variable	**OR (95% CI)**
Interpersonal Factors	

Bulled, Picked-on, or Excluded by Others
    Definitely true
    Somewhat true
    Not true[R]
	0.996 (0.992,1.000)

ACE Score[5]
    Child Experienced 0 ACE
    Child Experienced 1 ACE
    Child Experienced ≥ 2 ACE[R]
	1.003 (1.000,1.007)

Family Received Assistance in Last 12 Months[5]
    Assistance
    No assistance[R]
	1.473 (1.391, 1.559)*

Mental Health Status of Mother
    Excellent or very good
    Good, fair or poor[R]
	1.426 (1.288, 1.580)*

Tobacco Use in House
    No tobacco use
    Tobacco use[R]
	1.303 (0.982, 1.731)

Note:
Weight-status was defined as overweight and obese.
5. ACEs) Adverse Childhood Experiences (need to include a list of what these are in the methods:
Child Experienced: Hard to Cover Basics Like Food or Housing, Parent or Guardian Divorced, Parent or Guardian Died, Parent or Guardian Time in Jail, Adults Slap, Hit, Kick, Punch Others, Victim of Violence, Lived with Mentally Ill Person, Lived with Person with Alcohol/Drug Problem, Treated Unfairly Because of Race)
6: Assistance included, food stamps, WIC, cash, and free or reduced lunch.

Using descriptive statistics, the study scope was expanded by including community factors along with age and race. The total surveyed population was broken down into subgroups

or representative samples to gain a better, more comparable collection of responses. Of 710

children, 23.9% reported no neighborhood cohesion. Of 364 children, 12.3% reported

neighborhood cohesion. Of 453 children, 15.7% reported having no neighborhood amenities.

Of 350 children, 12.1% reported having neighborhood amenities. Of 2,254 children, 78%

reported not having neighborhood elements. Of 403 children, 13.9% reported having

neighborhood elements (Table 8).

Table 8: Descriptive Statistics for Community Factors in Obese and Overweight Children, ages 10-17

Variable	Responses	Frequency (%)
Neighborhood Cohesion[6]	No Cohesion Cohesion	710 (23.9) 364 (12.3)
Neighborhood Amenities[7]	Does not have neighborhood amenities Has neighborhood amenities	453 (15.7) 350 (12.1)
Detracting Neighborhood Elements[8]	Does not have neighborhood elements Has neighborhood elements	2,254 (78.0) 403 (13.9)

Note:
Weight-status was defined as overweight and obese.
6: Neighborhood Cohesion includes: people helping each other out, people watching out for each other's children, child being safe in neighborhood, and us knowing where to go for help in our community.
7. Neighborhood amenities includes: sidewalks/walking paths, park/playground, recreation center, and library/book mobile.
8. Detracting Neighborhood Elements include: litter/garbage, poorly kept rundown housing, and vandalism/graffiti.

Using a logistic regression model, an odds ratio was determined for each of the

community factors along with age and race. A significant relationship was not found between

children aged 10-17 having tobacco use in the house and being obese or overweight. A

significant relationship was also not found between children aged 10-17 having neighborhood

cohesion and being obese or overweight due to the odds ratio being within the confidence

interval. Of the children aged 10-17, the odds of not having neighborhood amenities was .931

times as likely as having neighborhood amenities. Of the children aged 10-17, the odds of not

having neighborhood elements was 1.205 times as likely as having neighborhood elements

(Table 9).

Table 9: Simple Logistic Regression for Community Factors Related to Obesity for non-Hispanic Black and Hispanic Children, Aged 10-17

BMI Obese or Overweight BMI %ile (ref: 1)	
Variable	**OR (95% CI)**
Community Factors	

Neighborhood Cohesion[6]
    No Cohesion
    Cohesion[R]
	1.000 (0.999, 1.001)

Neighborhood Amenities[7]
    Does not have neighborhood amenities
    Has neighborhood amenities[R]
	0.931 (0.903, 0.959)*

Detracting Neighborhood Elements[8]
    Does not have neighborhood elements
    Has neighborhood elements[R]
	1.205 (1.133, 1.282)*

Note:
6: Neighborhood cohesion included people helping each other out, people watching out for each other's children, child being safe in neighborhood, and us knowing where to go for help in our community.
7: Neighborhood amenities included sidewalks/walking paths, park/playground, recreation center, and library/book mobile.
8: Detracting neighborhood elements included litter/garbage, poorly kept rundown housing, and vandalism/graffiti.
R: Reference Group
* $p<0.05$, **$p<0.01$, ***$p<0.001$

A stepwise selection method was used within the multiple logistic regression model to

determine which factors significantly contributed to being obese or overweight. Results showed

age of child, mental health index, adverse childhood experiences score, and family receiving

assistance in the last 12 months to be significant (Table 10).

Table 10: Combined Model of Individual, Interpersonal, and Community Factors Related to Obesity for non-Hispanic Black and Hispanic Children, Aged 10-17

BMI Obese or Overweight BMI %ile (ref: 1)	
Variable	**OR (95% CI)**
Age of Child (years)	1.057 (1.036,1.077)*
Mental Health Index[1]	1.649 (1.332,2.040)*
ACE Score[2]	0.801 (0.757,.848)*
Family Received Assistance in Last 12 Months[3]	0.686 (0.281, 1.676)*

Note:
1: Mental Health Index was a composite of two variables if the study child had ever had depression or anxiety.
2: (ACEs) Adverse Childhood Experiences: Child Experienced: Hard to Cover Basics Like Food or Housing, Parent or Guardian Divorced, Parent or Guardian Died, Parent or Guardian Time in Jail, Adults Slap, Hit, Kick, Punch Others, Victim of Violence, Lived with Mentally Ill Person, Lived with Person with Alcohol/Drug Problem, Treated Unfairly Because of Race)
3: Assistance included, food stamps, WIC, cash, and free or reduced lunch.
R: Reference Group
* p<0.05, **p<0.01, ***p<0.001

Discussion

Significant associations were found between the prevalence of overweight and obese children and individual, interpersonal, and community factors. A significant association was also found between the prevalence of overweight status or obesity and prevalence of anxiety or depression in children aged 10-17 years old. However, when further broken down by race, non-Hispanic Black and Hispanic children, a significant association was not found. A follow-up study investigating childhood obesity among non-Hispanic Black and Hispanic populations and the prevalence of mental health conditions, including but not limited to anxiety and depression, as well as behavioral health conditions, could further contribute to findings on health disparities and inequities based on the social determinants of health. This could also identify potentially under-funded communities or barriers, such as access, to services such as preventative and mental health.

Data from this study supports the greater narrative that social determinants of health affect health outcomes among different populations. Low-income and non-White communities are known to have poorer health outcomes. If these communities have a higher prevalence of childhood obesity, a comorbidity of other chronic and serious conditions, and are the most disproportionately affected by social health disparities, then the health outcomes will be more severe if the current trend is upheld. Therefore, recommendations to local policy-makers would be to implement accessible programs for preventative health care and mental health services, in addition to health educational resources among low-income and non-White communities.

Conclusions

Using data from the 2017 NSCH and SPSS statistical analytical software, the study concluded that a significant correlate was not observed between non-Hispanic African-American and Hispanic obese children and the prevalence of anxiety and depression. These findings are consistent among national data (Mannan, Mamum, Doi, and Clarvino, 2016). The study literature review demonstrated that many variables contribute to childhood obesity including behavior and social determinants of health (includes mental health factors such as anxiety and depression). The study concluded that further investigation between the prevalence of mental health factors and childhood obesity should be conducted in order to determine if modifications are needed in program interventions on community, intrapersonal, and individual levels of social determinants of health.

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