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Sociodemographic Determinants Of Mental Health Outcomes Among Unhealthy Weight Youth In The United States

Chenchita Malolan
UTHealth School of Public Health

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by

CHENCHITA MALOLAN, BA

APPROVED:

BIJAL BALASUBRAMANIAN, MBBS, PHD

SARAH E. MESSIAH, PHD, MPH

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CHENCHITA MALOLAN
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Chenchita Malolan, BA, MPH
The University of Texas
School of Public Health, 2019

Thesis Chair: Sarah E. Messiah, PhD, MPH

Abstract

Background

The prevalence of unhealthy weight (defined as a body mass index ≥ 85th %ile for age and sex) among children and adolescents in the United States remains unacceptably high. In parallel, the prevalence of mental health issues in youth is rising as well. Current research shows a strong association between overweight/obesity and poor mental health outcomes. Specifically, youth of unhealthy weight have higher rates of anxiety and depression. The objective of this study is to evaluate the specific the current (2016-17) population-level prevalence of unhealthy weight, mental health issues and the sociodemographic (e.g. sex, age, race, ethnicity, household income) differences in (1) both of these health issues independently, and (2) as they relate to each other.

Methods

This is a retrospective, cross-sectional study utilizing the National Survey of Children's Health (NSCH), a representative sample of all youth in the United States ages 10 to 17. The NSCH is designed to produce national and state-level data on the physical and

emotional health of American children 10 - 17 years old. A total of 35,221 youth were included in this survey from 2016-2017. Descriptive statistics will be generated to determine the population prevalence of unhealthy weight and mental health issues by age, sex and race/ethnicity. Bivariate analyses including Chi square analyses were generated to explore relationships between healthy/unhealthy weight and the prevalence/non-prevalence of reported depression or anxiety. Finally, logistic regression models were generated to compute the odds of having mental health outcome (depression or anxiety) by healthy/unhealthy weight, and each sociodemographic characteristic. All statistical analysis were performed using Stata 15.

Results

The prevalence of unhealthy youth and the prevalence of depression or anxiety in youth vary by age, sex, race/ethnicity, food insecurity, parental divorce, and parental concern about their child's weight. After adjusting for these characteristics, overweight youth had 1.32 odds (95% CI: 0.62-2.81) of current depression or anxiety as compared to healthy weight youth. Obese youth had 0.74 odds (95% CI: 0.31-1.76) of current depression or anxiety as compared to healthy weight youth.

Conclusions

The results of this study will be used to inform programs and interventions focused both on unhealthy weight and/or mental health issues in youth. Future research could build on these conclusions to rigorously test whether certain socioeconomic groups have better outcomes as a result of targeted intervention strategies. Finally, as this is a cross-sectional study, a causal relationship cannot be inferred.

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BACKGROUND

Literature Review

Epidemiology of Overweight and Obesity in Children and Adolescents

Recent decades have seen the prevalence of overweight and obese individuals increase throughout the nation. The Center for Disease Control (CDC) categorizes overweight in children and adolescents as a Body Mass Index (BMI) at or above the 85th percentile but less than the 95th percentile adjusted for age and sex. Similarly, obesity is defined as having a BMI at or above the 95th percentile adjusted for age and sex.[1] Prevalence estimates of youth obesity rates have remained unacceptably high; as of 2015-2016, 1 in 5 school age children and adolescents aged 6 through 19 years are obese in the United States, and 1 in 3 are at an unhealthy weight.[1] In response to this, emphasis has been placed on identifying the causes and consequences of obesity in the general population. Childhood obesity is strongly associated with adverse health outcomes and chronic diseases such as type 2 diabetes, cardiovascular disease and certain cancers in adulthood.[2] In general, unhealthy weight is caused by the consumption of a high caloric diet, and high fat and sugar consumption in particular coupled with a sedentary lifestyle, or decreased amounts of physical activity.[2]

Obesity is more prevalent in Hispanics (25.8%) and Non-Hispanic Blacks (22.0%) than Non-Hispanic Whites (14.1%). Non-Hispanic Asians (11.0%) also had a lower prevalence than Non-Hispanic Blacks and Hispanics.[3] The prevalence of obesity also varied based on income status, with 18.9% in lowest income group, 19.9% in middle income group, and 10.9% in highest income group.[3] Studies have also shown that perception of overweight and obesity differs based on country of birth. For example foreign-born caregivers had a significantly less

chance to accurately distinguish their child's BMI percentile category as opposed to caregivers born in the United States.[4]

Epidemiology of Mental Health in Children and Adolescents

According to the CDC, a 2011-2012 national survey of children's health showed that 1 in 7 children from the ages of 2 to 8 years in the United States (US) had been diagnosed with a mental, behavioral, or developmental disorder.[5] Furthermore, in children and adolescents aged 3 through 17 years, 3.0% had anxiety and 2.1% had depression.[5] As seen with overweight and obesity prevalence, children and adolescents from poor families were more likely to have a mental, behavioral, or developmental disorder.[5] In addition, studies have shown a higher prevalence of depression and anxiety in minority populations including Hispanics and Non-Hispanic Blacks.[6] Current literature also indicates a rise in use of mental healthcare services among children and adolescents. Outpatient mental health care service use increased from 9.2% in 1996-1998 to 13.3% in 2010-2012.[7]

Association Between Overweight and Obesity and Mental Health in Children and Adolescents

To date, studies have shown an association between overweight and obesity and mental health outcomes. Higher lifetime prevalence of anxiety was found in a clinical sample of obese adolescents as compared to non-obese adolescents.[8] Some have hypothesized that this may be attributed to the stigmatization of obese children in the US.. Stigmatization leads to a negative body image, which in turn leads to anxiety and stress.[9] Furthermore, one metanalysis indicated that prevalence of depression among obese children was 10.4% and that the odds of depression were 32% higher (odds ratio 1.32 , 95% CI: 1.17-1.50) in obese children as compared to normal-weight children.[10]

Lack of physical activity is a significant contributing factor to the prevalence of overweight and obese children and adolescents. Similarly, systematic reviews have shown that sedentary behavior consistently has a negative association with mental health.[12] Conversely, physical activity can lead to improved self-esteem and provide further favorable effects to reduce depression.[11] It has also been suggested that physical activity can have positive longitudinal effects on mental health. Lack of physical activity in children and adolescents can also lead to some types of adverse mental health outcomes in the future.[12]

Demographic variations in this association have been studied extensively in the adult population. Studies have found that differences in the effect of sex in this association differ based on the type of disorder.[13] No conclusive evidence has been found on the impact of ethnicity on this association. Obesity was found to be associated with depression, but these results varied by ethnicity.[14] The effect of sociodemographic factors on this association in children and adolescents has not been as explicitly stated in the literature, and as such warrants a more in-depth review.

Public Health Significance

The prevalence of overweight and obese children and adolescents, the prevalence of mental health disorders in children and adolescents, and the potential association between the two lends supports the purpose of this study. As mentioned, there is limited amount of research specifically identifying the variations in sociodemographic factors as they relate to the association of overweight and obesity prevalence and mental health outcomes, and in US youth in particular. These potential differences have particular public health significance as our nation becomes increasingly diverse. Results generated here can inform the development of future interventions targeting high-risk groups and specific sub-populations.

Research Objectives

The overall goal of this study is to evaluate the sociodemographic differences in the association between overweight or obesity and mental health disorders, in children and adolescents aged 10-17 years, during 2016-2017 in the US.

Specific Aims:

1. To generate estimates of the US prevalence of overweight and obese children and adolescents, and learn how these estimates vary by sociodemographic characteristics including age, sex, race/ethnicity, and socioeconomic status.

   Hypothesis$_1$: We hypothesize that estimates will be highest in Hispanic males versus other ethnic groups.

2. To generate estimates of the US prevalence of mental health disorders (depression andanxiety in particular) in children and adolescents and how these estimates vary by sociodemographic characteristics including age, sex, race/ethnicity, and socioeconomic status.

   Hypothesis$_1$: We hypothesize that estimates will be highest in Non-Hispanic White females versus other ethnic groups.

3. To examine the overall distribution and odds of identified mental health issues by weight status (healthy weight or unhealthy [overweight/obese] weight) groups, and how these distributions are predicted by sociodemographic characteristics including age, sex, race/ethnicity, and socioeconomic status.

   Hypothesis$_1$: We hypothesize that the identified mental health issues will be most prevalent in unhealthy (overweight/obese) groups.

Hypothesis$_2$: We hypothesize that these estimates of identified mental health issues in unhealthy groups will be highest in Non-Hispanic White females of a lower socioeconomic status.

METHODS

Study Design

A retrospective cross-sectional study of 35,221 survey participants from the 2016-2017 National Survey of Children's Health (NSCH)[15] was used to generate all statistical analyses and findings.

Study Subjects

Households in the United States were randomly sampled to screen for households with more children between the ages of 10 through 17 years. One child from the identified household was then selected to be a part of the survey.

Data Analysis

Stata 15 was used to conduct descriptive, bivariate (chi square) and logistic regressionanalysis. An $\alpha = 0.05$ or below was considered significant. The appropriate weights were applied to all analyses to ensure all analysis results were nationally representative.

Univariate Methods

Descriptive statistics were generated to determine population characteristics (e.g. age, race/ethnicity, weight). They were also generated to determine prevalence of unhealthy weight and mental health issues, each by age, sex and race/ethnicity. Food insecurity was used as a proxy for socioeconomic status as household income was not determined.

Bivariate Methods

Chi square analyses were generated to determine association between unhealthy/healthy weight and the prevalence/non-prevalence of self-reported mental health outcomes (depression and anxiety).

Multivariate Methods

Bivariate logistic regression and ordered logistic regression models were generated to determine the odds of being health/unhealthy weight by the mental health outcomes and each sociodemographic characteristic. Models were adjusted for age, sex, race/ethnicity, family food situation, parental divorce status, and parental concern about child's weight.

Human Subjects, Animal Subjects, or Safety Considerations

This study was approved by the Committee for the Protection of Human Subject (CPS) at UTHealth Science Center in Houston.

RESULTS

Table 1 characterizes the sociodemographics of current depression or anxiety by BMI class. Overweight or obese males represented approximately20% of the total sample and overweight/obese females represented 15% of the sample. Around 15% of Hispanic youth are overweight or obese and represent the largest proportion of youth in both the overweight (9.21%) and obese (6.13%) BMI percentile groups.. Non-Hispanic White youth represent the largest proportion of youth in the healthy weight BMI class (34.42%). Healthy weight youth were able to "always afford to eat nutritious food" 35.05% of the time compared to overweight youth (15.38%) and obese youth (5.45%). Conversely, the percent of youth that could "always afford to eat, not always nutritious food" increased from 3.30% in overweight youth to 7.11% in obese youth. Furthermore, 75% of caregivers who have overweight or obese children are not concerned about their child's health, in contrast to only 25% who do think that their child's weight is too high, or is a health concern. Furthermore, 37.8% of caregivers who have obese children with depression or anxiety are not concerned about their child's weight, while 61.5% reported that their child's weight is too high or is a health concern. Moreover, we also found that 12% of youth with depression or anxiety, who were of unhealthy weight, had caregivers who were divorced.

Table 2 lists the sociodemographic characteristics of youth by BMI class and the Chi square analysis to determine the association between the two. The average age was 13.69 years (SD: 2.32) for healthy weight youth, 13.26 years (SD: 2.12) for overweight youth, and 13.40 years (SD: 2.12) for obese youth (t-test = 17.09, p-value <0.001). Around 18% of males and 15% of females were overweight or obese (X^2 = 164.23, p-value <0.001). The proportion of Hispanic youth (4.63% to 5.33%) and Non-Hispanic Black youth (2.57% to 3.23%) increased from the

overweight to obese BMI class, as opposed to the proportion of Non-Hispanic White youth, which decreased (7.34% to 6.96%) (X^2 = 827.21, p-value <0.001). Similarly, the proportion of youth that could "always afford to eat, not always nutritious" (5.04% - 5.83%), "sometimes could not afford to eat" (0.83% - 1.51%), and "often could not afford to eat" (0.25% to 0.41%) all increased from the overweight to obese class, while proportion of youth that "always could afford to eat nutritious food" (10.00% - 8.98%) decreased from the overweight to obese class (X^2 = 647.20, p-value <0.001). The proportions of current depression and anxiety were relatively stable across BMI categories, with less than 2% of the youth having depression or anxiety in the overweight and obese class. Around 25% of caregivers who are not concerned about their child's health have unhealthy weight youth, in contrast to close to only 10% that do think that their child's weight is too high (X^2 = 9186.00, p-value <0.001).

Table 3 lists the sociodemographic characteristics of youth by prevalence of current depression or anxiety and the Chi square analysis to determine the association between the two. Youth with depression or anxiety were 0.66 years older than youth without depression or anxiety (t-test = 5.86, p-value < 0.05). Females were slightly more likely (1.50%) to have current depression or anxiety than males (1.46%). Non-Hispanic White youth represented the highest number of youth with current anxiety or depression, followed by Hispanic youth. In terms of food security,, the majority of the sample reported they could always afford to eat nutritious food both with and without current depression or anxiety (X^2 = 71.04, p-value <0.05).

Table 4 reports odds ratios and 95% confidence intervals for weight and mental health outcomes (Y/N) by chosen predictors., Overweight youth had 1.32 odds (95% CI, 0.62-2.81) of reporting current depression or anxiety versus healthy weight youth. In contrast, obese youth had 0.74 decreased odds (95% CI, 0.31-1.76) of current depression or anxiety compared to

healthy weight youth. Hispanic youth had 1.55 increased odds (95% CI, 0.91-2.64) of having current depression or anxiety compared to Non-Hispanic White youth. Youth that "sometimes could not afford to eat" had almost 2 times higher odds of having depression or anxiety (OR: 1.87, 95% CI: 0.98-3.57). Conversely,, youth who "often could not afford to eat" had an almost 30% decreased odds of reporting current depression or anxiety (95% CI 0.28-1.68). Youth whose parents were concerned that their child's weight was too low had 2.50 increased odds (95% CI, 0.98-6.39) of having depression or anxiety.

DISCUSSION

We report 4 key findings from our study: 1) our national prevalence estimates of unhealthy weight youth are very similar to other national prevalence estimates (e.g NHANES);, 2) our national prevalence estimates of current depression or anxiety are significantly lower (about half) than other reported estimates; , 3) for youth with depression or anxiety, as BMI class increased, so did disparities in age, sex, race/ethnicity, food insecurity, parental divorce, and parental concern about child's weight; and 4) When controlling for age, sex, race/ethnicity, food insecurity,, parental divorce status, and parental concern over weight of their child, only overweight youth had a higher odds of having depression or anxiety. These findings allow us to delineate target populations at risk for unhealthy weight and/or adverse mental health outcomes. Understanding these populations will help to inform specific interventions to help address or prevent these outcomes.

Our national prevalence estimates of unhealthy weight are consistent with findings from the CDC.[1] However, they are inconsistent with national prevalence estimates by race/ethnicity from the National Health and Nutrition Examination Survey (NHANES) that show that Hispanic and Non Hispanic Black youth have higher prevalence of unhealthy weight.[16] We found that being overweight or obese is more prevalent in Non-Hispanic White youth (14%) as compared to Hispanic youth (10%) and Non-Hispanic Black youth (6%). It is important to note here that in our study, caregivers were self-reporting height and weight measurement, from which BMI was calculated. Whereas in NHANES, height and weight were both objectively measured.

Strikingly, the number of Hispanic and Non-Hispanic Black youth of unhealthy weight was similar to the number of Hispanic and Non-Hispanic Black youth of healthy weight.

Conversely, there was a significantly less number of Non-Hispanic White youth of unhealthy weight as compared to Non-Hispanic White youth of healthy weight. This indicates that Non-Hispanic White youth have lower prevalence rates of unhealthy weight than prevalence rates that Hispanic and Non-Hispanic Black youth. Previous studies verify this by demonstrating that racial minorities like the Hispanic population are disproportionately affected by rates of obesity. This could be a result of cultural backgrounds in terms of diet and nutrition and physical activity.[17] Existing literature shows that Hispanics also have lower rates of physical activity, which could contribute to the prevalence estimates we found.[18] Moreover, acculturated Hispanics also adopt a more Americanized diet that is higher in processed foods and sugar-sweetened beverages, that lead to unhealthy weight at higher rates than traditional diets.[19]

Interestingly, we also found that females were more likely to be of healthy weight and males were more likely to be obese across race/ethnicities except for Non-Hispanic Blacks, in which there were higher proportions of males in both the healthy weight and obese classes. Gender differences are still understudied in literature, though it has been suggested that factors such as hormonal changes and general body composition may contribute to this finding.[20] Furthermore, our food insecurity findings were similar to previous studies in which less than 5% of youth that were unhealthy weight "sometimes could not afford to eat" or "often could not afford to eat", though the proportions of both of these increased as BMI class increased.[21]

Our national prevalence estimates for current depression or anxiety in youth were not similar to the current CDC estimates.[5] Our estimates were almost 50% less than what has been previously reported. We theorize that a major reason for this disparity is (1) stigmatization of perceived mental illness in the youth and (2) caregiver report/ response on behalf of their child. This has significant implications for this study as it not only underestimates our prevalence

estimates but also impacts the association between unhealthy weight and mental health. Previous literature has corroborated the idea that youth are hesitant to speak out about their issues with mental health including depression and anxiety, making it possible that in our study current depression or anxiety was underreported.[22] This stigma is further exemplified amongst different cultural groups. For example, the Non-Hispanic Asian population is less likely to report anxiety or depression, as these cultures advocate for controlling emotions, leading to underreporting of mental health issues.[23] Understanding cultural barriers for admitting mental health illness and seeking care is essential to the improvement of mental health outcomes in youth.

We did not find significant differences among male and female youth that have current depression or anxiety. Literature is inconsistent in identifying these differences in sex, though some suggest that females have higher rates of depression or anxiety.[24] One explanation for this is the idea that females tend to speak out about and seek help for their anxiety and depression, again leading to an underreporting of these issues in males.[25] Furthermore, while our study did not find any conclusive results for family food situation and having depression or anxiety, food insecurity has also been shown to raise odds of anxiety disorders in adolescents.[26]

Our study is one of the few that characterizes the sociodemographic differences among unhealthy weight youth by BMI classes. Previous studies have assessed the association between unhealthy weight and depression or anxiety in youth before or identified race/ethnicity and gender differences in the adult population. However, there is limited literature concerning these differences between the intersection of unhealthy weight and mental health in youth. We found that similar trends exist for sociodemographic characteristics of this association as they do for sociodemographic characteristics of unhealthy weight or depression or anxiety alone. Additionally, as BMI class increases, youth with current or anxiety become more likely to have

divorced parents. Children with divorced parents have higher prevalence of both unhealthy weight and are excess risk of depression in adulthood.[27,28] Single-parent households are particularly important to study, as the likelihood of miscommunication between parents and their child increases. Lifestyle and diets could differ between each parent causing the child to adopt individual habits per household, affecting both weight and mental health.

Intriguingly, a majority of the parents with unhealthy youth who had depression or anxiety were also not concerned about their child's weight status and did not think that it was too high or too low. Again, this is consistent with literature suggesting that parents often misclassify their children as healthy weight.[29] The prevalence of obesity has steadily increased over the past several decades, causing the public to become more accustomed to unhealthy weight in the media and in their communities. Combined with lack of education regarding the health effects of unhealthy weight, this has desensitized the public to the dangers of unhealthy weight over the years. Repercussions of this include lack of effort on the parents' parts to alter lifestyle leading to continued unhealthy weight in their children and lack of knowledge on the part of the child about their health status. This could result in two possible outcomes: (1) the child does not face pressure at home to maintain a healthy weight, leading to less anxiety; or (2) the child does not have an appropriate support system at home to support healthy weight, increasing anxiety. For the latter, it has been reported that Hispanic and Non-Hispanic Black youth have better support systems at home and in their communities than Non-Hispanic White and Non-Hispanic Asian youth, perhaps influencing depression and anxiety in these youth.[23]

Strengths and Limitations

The strength of this study is that it is a nationally representative sample allowing us to draw conclusions about the US population. It was comprehensive survey allowing us to analyze

multiple factors affecting both unhealthy weight and mental health. This study also has limitations with regards to the study design. While this study looks at youth, the parents or caregivers of the child provided the survey responses. Additionally, the caregivers were able to select the child that they wanted to provide information about. This could lead to underreporting of both physical and mental health characteristics of their youth (non-differential misclassification or information bias). Furthermore, the caregivers were asked generic questions about the child's mental health status ("is your child currently depressed"), which may have resulted in these same issues. As this is a retrospective study, causality cannot be measured between unhealthy weight and depression or anxiety. Future studies must interview youth directly and attempt to draw causal inferences between the sociodemographic determinants of the association between unhealthy weight and mental health.

CONCLUSION

Results reported here show that in the US in 2016 – 2017, the prevalence of unhealthy youth and the prevalence of depression or anxiety in youth vary by the following sociodemographic determinants: age, sex, race/ethnicity, food insecurity, parental divorce, and parental concern about their child's weight. After adjusting for these characteristics, overweight youth had higher odds of having depression or anxiety. This study should be used to inform future work on understanding the causes behind these disparities in sociodemographic determinants and how they affect the relationship between unhealthy weight and mental health.

Table 1: Sociodemographic Characteristics of US Youth With Current Depression or Anxiety, National Survey of Children's Health, 2016-2017 Stratified by BMI Class

Total Sample (n=35,221)	**Current Depression or Anxiety (Yes)**		
Demographics8	**Healthy Weight**	**Overweight**	**Obese**
	n (weighted %)	**n (weighted %)**	**n (weighted %)**
Age (sd)	**14.13 (2.50)**	**14.47 (1.88)**	**13.71 (2.37)**
Sex			
Male	**333 (28.01)**	**81 (13.41)**	**89 (7.16)**
Female	**390 (36.42)**	**87 (7.47)**	**68 (7.53)**
Race			
NH White	**551 (34.42)**	**120 (5.68)**	**105 (5.80)**
NH Black/African American	**27 (4.86)**	**10 (4.74)**	**6 (2.03)**
Hispanic	**64 (19.99)**	**23 (9.21)**	**31(6.13)**
NH Asian	**24 (1.97)**	**2 (0.01)**	**3 (0.03)**
NH American Indian/Alaskan Native	**2 (0.04)**	**1 (0.16)**	**1 (0.02)**
NH Native Hawaiian/Pacific Islander	**1 (0.04)**	**0 (0)**	**1 (0.06)**
NH Other	**5 (0.22)**	**0 (0)**	**2 (0.15)**
Two or More Races	**49 (2.88)**	**12 (1.08)**	**8 (0.49)**
Family Food Situation			
Always afford to eat nutritious food	**522(35.05)**	**112 (15.38)**	**81 (5.45)**
Always afford to eat, not always nutritious	**145 (23.53)**	**46 (3.30)**	**55 (7.11)**
Sometimes could not afford to eat	**33 (5.45)**	**10 (2.59)**	**13 (1.36)**
Often could not afford to eat	**8 (0.57)**	**0 (0.00)**	**7 (0.20)**
Parents Divorced			
Yes	**280 (24.19)**	**71 (6.30)**	**75 (6.12)**
No	**431 (40.28)**	**94 (14.25)**	**79 (8.86)**
Parental Concern About Child's Weight			
Yes, it is too high	**16 (5.93)**	**42 (2.05)**	**96 (7.36)**
Yes, it is too low	**30 (2.45)**	**0 (0)**	**1 (1.56)**
No, not concerned	**675 (55.98)**	**126 (18.90)**	**59 (5.77)**

Table 2: Sociodemographic Characteristics of US Youth, National Survey of Children's Health, 2016-2017 Stratified by BMI Class

Total Sample (n=35,221)				
Demographics	**Healthy Weight n (weighted %)**	**Overweight n (weighted %)**	**Obese n (weighted %)**	**X^2 test or *t* test**
Age (sd)	**13.69 (2.32)**	**13.26 (2.12)**	**13.40 (2.12)**	**17.09*** **
Sex				**164.23*** **
Male	**11,317**	**2587 (7.95)**	**2740 (9.82)**	
Female	**(32.81)**	**2420 (8.25)**	**1796 (6.99)**	
	12,196			
	(34.18)			
Race				**827.21*** **
NH White	**17,247**	**3,431 (7.34)**	**2,935 (6.96)**	
NH Black/African American	**(37.95)**	**349 (2.57)**	**450 (3.28)**	
Hispanic	**1,176 (8.01)**	**619 (4.63)**	**684 (5.33)**	
NH Asian	**2,209 (14.45)**	**247 (0.68)**	**128 (0.29)**	
NH American Indian/Alaskan Native	**1,297 (3.04)**	**38 (0.10)**	**40 (0.12)**	
NH Native Hawaiian/Pacific Islander	**107 (0.21)**	**17 (0.01)**	**19 (0.04)**	
NH Other	**56 (0.08)**	**41 (0.10)**	**22 (0.04)**	
Two or More Races	**164 (0.47)**	**265 (0.76)**	**258 (0.76)**	
	1,257 (2.79)			
Family Food Situation				**647.20*** **
Always afford to eat nutritious food	**18,101**	**3,445 (10.00)**	**2,634 (8.98)**	
Always afford to eat, not always nutritious	**(47.21)**	**1,250 (5.04)**	**1,466 (5.83)**	
	4,289 (15.75)			
Sometimes could not afford to eat		**202 (0.83)**	**297 (1.51)**	
Often could not afford to eat	**688 (3.52)**			
		46 (0.25)	**74 (0.41)**	
	135 (0.67)			
Parents Divorced				232.31***
Yes	**6,165 (20.02)**	**1,558 (5.56)**	**1,636 (6.76)**	
No	**16,970**	**3,364 (10.63)**	**2,813 (9.97**	
	(47.06)			
Parental Concern About Child's Weight				
Yes, it is too high	**421 (16.2)**	**988 (2.96)**	**2,471 (8.47)**	
Yes, it is too low	**30 (1.60)**	**19 (0.12)**	**15 (0.14)**	
No, not concerned	**22,413**	**3,980 (13.14)**	**2029 (8.18)**	
	(63.77)			
Current Depression or Anxiety				**17.58**
Yes	**723 (1.93)**	**168 (0.62)**	**157 (0.44)**	
No	**22,790**	**4,839 (15.57)**	**4,379 (16.37)**	
	(65.07)			

*** p-value <0.001

Table 3: Sociodemographic Characteristics of US Youth, National Survey of Children's Health, 2016-2017 Stratified by Presence of Current Depression or Anxiety

Total Sample (n=35,221)			
Demographics	**Current Depression or Anxiety (Yes) n (weighted %)**	**Current Depression or Anxiety (No) n (weighted %)**	**X^2 test or *t* test**
Age (sd)	**14.14 (2.40)**	**13.52 (2.28)**	**5.86***
Sex			**0.59**
Male	**533 (1.46)**	**17,251 (49.11)**	
Female	**589 (1.50)**	**16,848 (47.93)**	
Race			**71.57**
NH White	**828 (1.39)**	**24, 094 (49.84)**	
NH Black	**48 (0.33)**	**2,169 (14.19)**	
Hispanic	**128 (1.04)**	**3,708 (23.79)**	
NH Asian	**31 (0.06)**	**1,776 (3.98)**	
NH American Indian/Alaskan Native	**4 (0.01)**	**197 (0.43)**	
NH Native Hawaiian/Pacific Islander	**2 (0.003)**	**100 (0.14)**	
NH Other	**7 (0.0.01)**	**234 (0.59)**	
Two or More Races	**74 (0.13)**	**1,821 (4.08)**	
Family Food Situation			**71.04***
Always afford to eat nutritious food	**761 (1.65)**	**24,660 (63.80)**	
Always afford to eat, not always nutritious	**261 (0.98)**	**7,231 (26.01)**	
Sometimes could not afford to eat	**59 (0.32)**	**1,234 (5.80)**	
Often could not afford to eat	**16 (0.02)**	**268 (1.41)**	
Parents Divorced			**11.02**
Yes	**453 (1.10)**	**9,473 (31.36)**	
No	**635 (1.84)**	**23,708 (65.70)**	
BMI Class			**17.58**
Healthy Weight	**723 (1.93)**	**22,790 (65.07)**	
Overweight	**168 (0.62)**	**4,839 (15.57)**	
Obese	**157 (0.44)**	**4,379 (16.37)**	

* p-value <0.05

Table 4: Adjusted Odds Ratios Evaluating the Association Between BMI Class and Current Depression or Anxiety Among US Youth, National Survey of Children's Health, 2016-2017

	Current Depression or Anxiety AOR (95% CI)
BMI Class[a]	
Healthy Weight	**Ref**
Overweight	**1.32 (0.62 – 2.81)**
Obese	**0.74 (0.31 – 1.76)**
Age[b]	**1.13 (1.00 – 1.27)**
Sex[c]	
Male	**Ref**
Female	**1.04 (0.67 – 1.61)**
Race[d]	
NH White	**Ref**
NH Black/African American	**0.88 (0.50 – 1.53)**
Hispanic	**1.55 (0.91 – 2.64)**
NH Asian	**0.57 (0.21 – 1.58)**
NH American Indian/Alaskan Native	**0.55 (0.12 – 2.48)**
NH Native Hawaiian/Pacific Islander	**0.66 (0.13 – 3.44)**
NH Other	**0.46 (0.14 – 1.49)**
Two or More Races	**1.17 (0.72 – 1.89)**
Family Food Situation[e]	
Always afford to eat nutritious food	**Ref**
Always afford to eat, not always nutritious	**1.47 (0.87 – 2.50)**
Sometimes could not afford to eat	**1.87 (0.98 – 3.57)**
Often could not afford to eat	**0.69 (0.28 – 1.68)**
Parents Divorced	
Yes	**1.06 (0.74 – 1.53)**
No	**Ref**
Parental Concern About Child's Weight	
Yes, it is too high	**1.26 (0.46 – 3.44)**
Yes, it is too low	**2.50 (0.98 – 6.39)**
No, not concerned	**Ref**

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