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Do Puerto Rican Youth with Asthma and Obesity Have Higher Odds for Mental Health Disorders?

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Abstract

Island Puerto Rican (PR) youth experience disproportionately high asthma and obesity rates compared with other racial/ethnic groups on the U.S. mainland. Previous research has demonstrated associations of chronic disease with psychiatric disorders. We examined the relationship among anxiety/depressive disorders, asthma and obesity in an epidemiological community sample of youth. The sample (n=656) was derived from the second wave of an island-wide probabilistic representative household sample of PR youth stratified and based on whether or not they had a diagnosis of asthma and/or depressive/anxiety disorder. For this study we used the subpopulation ages 10–19 years. Asthma and obesity were significantly related to higher odds of depressive/anxiety disorders in youth. Obesity moderated the relationship between asthma attacks and depressive/anxiety disorders. The relationship between asthma attack and higher odds for depressive/anxiety disorders was only present in the non-obese group. Among the obese, females show a significant increase from 11–36% in the prevalence of anxiety/depressive disorders. Asthma and obesity were highly prevalent and a significant association was found between asthma attack and depressive/anxiety disorders. The effects of asthma and obesity were not additive; the prevalence for psychiatric disorder for those having both conditions did not increase above the prevalence associated having only one of the conditions. Future studies should consider including longitudinal designs and examine the extent to which important variables not included in this study such as body image dissatisfaction, particularly among females, teasing and discrimination may moderate the relationship between obesity and depressive and anxiety disorders in youth.

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INTRODUCTION

Puerto Rican children experience some of the highest asthma and obesity rates of any racial/ethnic group in the U.S.^{1–4} A recent population-based study reported a lifetime prevalence of asthma of 35% for Puerto Rican children living in New York and 41% for those living in the San Juan Metropolitan area.⁵ Puerto Rican children also experience the highest asthma morbidity with recent asthma attack rates of 12%.² Pediatric obesity rates from 24%–36% have been shown in Puerto Rican populations on both the mainland and island.^{6–7} A new category of youth is also emerging in the literature – those with co-occurring asthma and obesity.^{8, 9}

Research has shown that youth with chronic health conditions, such as asthma and obesity, may be at greater odds for mental health problems than youth without these health conditions. Youth with asthma experience higher rates of anxiety/depressive disorders,^{10–12} as well as symptoms associated with these conditions relative to their non-chronically ill counterparts.^{11–13} Similar research carried out in community samples from Puerto Rico (PR) have also shown a significantly higher risk of anxiety/depressive disorders among youth diagnosed with lifetime asthma and experiencing asthma attacks in the last year.^{10–14}

Associations between overweight/obesity and anxiety/depressive disorders have been shown in clinical samples;^{(15–16} for reviews) while community studies have found no relationship except among the extremely obese,¹⁷ the chronically obese¹⁸ or those from community samples referred to weight control clinics.¹⁹

Given the high rates of pediatric obesity and asthma in PR and given that these two conditions often co-occur,^{8–9} expanding our understanding of the association between these two conditions with depression and anxiety becomes a pertinent public health concern. This is particularly important because early identification in primary health clinics of psychiatric conditions among obese and asthmatic youth would be necessary in order to provide appropriate mental health treatment. In this study, we use an island-wide representative household sample of Puerto Rican youth 10 to 19 years of age to examine the individual relationships between depressive/anxiety disorders and asthma morbidity (asthma attacks), obesity, and youth with both asthma and obesity. Our hypothesis is that youth with asthma and/or obesity will be at higher odds for depressive and anxiety disorders compared with youth without these conditions. If this hypothesis is correct, we will examine whether obesity moderates the relationship between asthma and depressive/anxiety disorders. Because in US and international studies modest associations have been found between depressive symptoms and obesity in girls but not boys,^{20–21} we also test whether gender moderates the relationship between obesity and depressive/anxiety disorders.

METHODS

Sample Design

Data for this study are from the third wave of the Asthma, Depression and Anxiety in Puerto Rican Youth (ADA) study (2005–2008) which was designed to assess the prevalence and correlates of psychiatric disorders and service utilization among Puerto Rican children and youth 4 to 17 years of age.^{10, 22}

Details regarding the sampling design and procedures have been previously described for wave 1 and 2 (See ^{10, 22}). At wave one, an island-wide household probability sample of 1886 children/youth and their parents were interviewed. A total of 1789 youth and their caregivers from wave 1 were interviewed at wave 2. For wave 3, all youth from wave 2 who had reported ever having a physician diagnosis of asthma and also met criteria for the

Diagnostic Statistical Manual (Version 4 or DSM IV)²³ for any threshold and sub-threshold anxiety and or depressive disorder (n=176) were identified. Continuing with the stratified simple-random sample selection method, three additional groups of youth were identified: 1) youth who had reported ever having a physician diagnosis of asthma but no DSM-IV criteria for any threshold and sub-threshold anxiety and or depressive disorder (n=241), 2) youth who did not have asthma but met criteria for a threshold or sub-threshold disorder (n=175), and 3) youth without a lifetime diagnosis of asthma and no psychiatric disorder (n=233). The study sample resulted in 825 households, of which 656 youth 10 to 25 years of age were interviewed for a response rate of 79.5%. Because the current study focuses only on youth and not young adults, we included parent-youth dyads with youths between 10 and 19 years old (n=436) at the time of wave 3 data collection.

The study was approved by the institutional review boards (IRB) of the University of Puerto Rico, Medical Sciences Campus and the University of California, Los Angeles. Survey administration: Procedures

Blinded interviewers conducted interviews in the families' homes. Caregiver consents, youth assents, and youth consents for participants 18 years and older were obtained. Caregivers were interviewed about demographics and their child's asthma, weight, height, general health and mental health. Youth weight and height information were obtained via parental report for youth below age 17 years. Youth 17 to 19 years of age provided information on their own weight and height. Parents and youth were interviewed concerning their mental health, asthma, and general health.

Survey measures

Anxiety and Depression—Were measured using the official Spanish translation of the Diagnostic Interview Schedule for Children and Youth (DISC-IV)²³ The DISC-IV is a structured instrument used for the assessment of DSM IV²⁴ psychiatric disorders in pediatric populations. The Spanish version of the DISC IV was found to be as reliable in 6 to 17 year old Puerto Rican youth as the English version of the same instrument²³. There is a child version in which the child reports psychiatric symptoms in regard to himself/herself and a parent version in which the parent or caretaker reports symptoms in regard to the child. Anxiety threshold disorders measured in the present study included: generalized anxiety, panic, social phobia, separation anxiety, or post-traumatic stress disorder during the past year. Depressive disorders included major depression and dysthymia. We used DISC-IV algorithm (version M) to measure threshold psychiatric disorders. We combined parental and youth reports by following an OR rule, which scores positive any symptom endorsed by either parent or child.

Asthma—Asthma was assessed by parental or youth (10 to 19) report of whether the youth had ever been diagnosed by a physician with asthma and had an asthma attack in the past 12 months. We used parent-reported asthma attack for youth participants younger than 17 years or youth self-reported asthma attack for youth 17 years or older (17–19 years). The use of a morbidity variable (asthma attacks) in this analysis, which predicts symptomatic asthma instead of prevalence, was based on previous analyses from waves 1 and 2 where asthma attacks proved to be more consistent and predictable than rates of lifetime asthma diagnosis.^{3,10,14}

Sociodemographics—Socio-demographic variables reported by parents included: education, marital status, work status, income, household members, perception of poverty, youths' age, sex, and school years. Parents reported their perception of poverty as living well, living from check to check, or living poorly. This item was adapted from a measure

developed by Gore et al.,²⁵ and was used instead of other indicators of poverty based on analyses from wave 1.²²

Body Mass Index—BMI was calculated from caregivers' estimation of their children's height and weight for youth below 17 years, and youth 17–19 years of age provided information for their own weight and height. We plotted BMI on the Center for Diseases Control and Prevention (CDC)²⁶ charts for age growth to obtain a percentile ranking. In accordance with CDC [26] defined BMI cut-off scores, “obesity” was defined as having a BMI equal to or greater than the 95th percentile based on the youth's height and weight. “Overweight” was defined as having a BMI equal to the 85th percentile but less than the 95th percentile; “healthy weight” as having a BMI equal or greater than the 5th percentile but less than the 85th percentile and “underweight” as having a BMI less than the 5th percentile.

Analysis

Analyses were weighted to account for the complex multi-stage sample design that resulted in unequal probabilities of selection between subjects and to represent the general population of youth in Puerto Rico in the year 2008 based on the US Census Bureau data. The estimation of design weights used to make our sample representative of the population of youth in Puerto Rico was accomplished in two stages. In the first stage we estimated the subjects' probability of selection during the third wave and made a further adjustment for the response rate. The probability of selection took into account the fact that for wave 3 we selected different number of subjects from four strata of different sizes (based on their anxiety, depression and asthma status in the previous wave). The inverse of this final probability was used to estimate initial design weights. The design weight estimated during this first stage made our sample representative of the population of youth in Puerto Rico in the year 2000 based on the 2000 Census Bureau similarly to the sample obtained at wave 2. In the second stage we made a further adjustment to our design weights by doing a post-stratification to the population of youth in Puerto Rico in the year 2008 based on the US Census Bureau. This post-stratification was conducted based on the distributions of gender and age divided into 3 age categories that represented the age of participants in wave 3. The categories were 10–14 years, 15 to 19 years and 20 to 25 years.

To conduct the analyses we used SUDAAN software release 10.0, which was specifically developed to correctly analyze survey data obtained from a complex sample design. The software takes into account stratification, unequal weighting and clustering (non-independence of observations) when estimating standard errors for parameter estimates in statistical models.

For our dependent variable called “depressive/anxiety disorders,” we collapsed depressive and anxiety disorders into one category. This increased our statistical power and is clinically acceptable since both disorders are within the broader category of internalizing or emotional disorders.²⁷

Similarly, we collapsed overweight, normal weight and underweight into one category (non-obese) in order to increase the number of subjects in our reference group, increase statistical power and reduce the number of parameters to be estimated. Obese youth were the comparison group for the non-obese.

We considered including age, gender and perception of poverty as a proxy for socioeconomic status into the models as independent predictors. However, in logistic regression analyses, these variables were not significantly related to depressive/anxiety disorders individually or as a group. Gender was retained in the multivariate models because of a strong theoretical and empirical relationship between gender, depressive/anxiety

disorders, and obesity,^{20–21} but the other variables were not. We decided to have fewer covariates in our models in order to increase the statistical power to detect interactions by reducing the standard error of coefficients in regression models.

Logistic regression was used to assess the individual relationships between depressive/anxiety disorders and asthma attack, as well as obesity. Logistic regression models were also fitted with the independent predictors; asthma attack, obesity, and their interaction in order to examine if obesity was a moderator of the effects of asthma attack. The same modeling strategy was repeated but used obesity as a predictor and gender as a moderating variable. Finally, in the subpopulation of those with asthma, we also estimated a model for depressive/anxiety disorders using as predictors perception of asthma severity (as a proxy for severity of asthma), obesity and gender.

RESULTS

In general, there was an even distribution of male (51.0%) with female (49.9%) youth in the sample with a mean age of 15 (10–19 years old). The prevalence of asthma attack was 20.4%. Almost 14% (n=72) of youth met criteria for any depressive/anxiety; 11.07% (n=61) for any depression [Major Depression (n=32; 6.8%), Dysthymia (n=3; 0.3%)] and 7.09% (n=34) for any anxiety disorders [Separation Anxiety (n=28; 4.6%); Social Phobia (n=20; 6.3%); Generalized Anxiety (n=18; 5.0%); Panic (n=8; 1.0%); Post Traumatic Stress (n=5; 0.8%)]. Most youth were at healthy weight (58%), 15.3% were overweight and 21.5% were obese.

Table 1 shows the distribution of family socio-demographic characteristics (age, sex, and income), asthma attack and obesity status among youth that met criteria for any anxiety/depressive disorder compared with youth who did not meet criteria for these disorders. There were no significant differences between these two groups regarding their age, gender, and other socio-demographic characteristics. Marginal significant associations were noted between presence of a depressive/anxiety disorder and asthma attack ($p=.06$) and obesity ($p=.07$). Models predicting depressive/anxiety disorders

The first model in these analyses estimated a simple logistic regression between depressive/anxiety disorders and asthma attack (Table 2). A positive relationship between asthma attack and depressive/anxiety disorder was found. Subjects who reported asthma attacks were almost two times as likely to meet criteria for depressive/anxiety disorders than those without an asthma attack. Similarly, the second model estimated the relationship between depressive/anxiety disorders and obesity and a positive relationship between obesity and depressive/anxiety disorders was found. Obese youth were two times more likely to have a diagnosis of depressive/anxiety disorders than non-obese youth. When both asthma attack and obesity were included in the model (Model 3), asthma attack was still associated with increased depressive/anxiety disorders while the effect of obesity became non-significant. An interaction term for asthma attack-obesity was then included to examine the extent to which obesity moderated the effect of asthma attacks on depression/anxiety. The interaction term was significant and can be best understood by looking at a plot of the model based predicted probabilities (See figure 1). The effects for asthma attack among those who were not obese were highly significant. The non-obese who had asthma attacks were more than three times as likely meet criteria for depressive/anxiety disorders than the obese. In this subgroup, the prevalence of depressive/anxiety disorders increased from 10% to 26% for those who had an asthma attack. The effect of asthma attack among those who were obese was non-significant. Thus, obesity moderates the effects of asthma attack. In other words, the relationship between asthma attack and higher risk for depressive/anxiety disorders is not present among the obese; it is only present in the non-obese. In this model, the simple

effect for obesity was also significant. As seen in figure 1, this means that the main effects of obesity among those who did not have an asthma attack is to increase the probability of depressive/anxiety disorders. Those who are obese are almost 3 times as likely to have depressive/anxiety disorders. In this group, the model based predicted prevalence of disorders increases from 10% to 23%. In summary, both asthma attack and obesity increase the risk for depressive/anxiety disorders when they occur by themselves without comorbidity. However having both conditions does not increase the risk above any of the conditions by themselves.

Logistic regression Models for depressive/anxiety disorders and obesity and gender

In the first model we used gender as a predictor. This model (Table 3) did not find a significant relationship between gender and the occurrence of depressive/anxiety disorders. When both obesity and gender were included in the model, obesity had a positive relationship with depressive/anxiety disorders whereas gender did not predict the occurrence of depressive/anxiety disorders. Similar to the previous models, obese youth were two times as likely to have a disorder than non-obese youth. An interaction term for obesity-gender was included to examine the extent to which gender moderated the effect of obesity on disorders. In this model, the interaction term was large and significant. This interaction can be best understood by looking at a plot of the model based predicted probabilities (See figure 2) which shows that there is a large positive effect for obesity among females. For females, the prevalence of depressive/anxiety disorder increased from 11% to 36% for those who were obese. The effect of obesity among males was non-significant. In this group the depressive/anxiety prevalence of disorder remained at 15%.

We also conducted analysis to examine whether the severity of asthma was associated with depressive/anxiety disorders. These analyses were conducted with the subpopulation of our sample ($n=218$) that met criteria for lifetime asthma attack, asthma-related hospitalization or a diagnosis of asthma by a health professional. These were the only subjects with information on asthma severity. For these analyses we used parent report of youth asthma severity. Asthma severity was rated on a likert five-point-scale ranging from very mild to very severe. For our analysis, this variable was treated as a continuous variable. These results should be considered preliminary since in this group we only had 46 cases positive for depressive/anxiety disorders and therefore power is reduced in relation to analyses conducted with the whole sample. In particular, we did not include an interaction term in our model between severity of asthma and obesity since power was extremely poor. We estimated a main effect model including child's gender, obesity and severity of asthma. The omnibus test of the hypothesis that all regression coefficients minus intercept were equal to zero was not significant (Wald $F = 1.47$, $df = 3$, $p = .22$). Therefore in the multivariate adjusted model, we cannot reject the global hypothesis that all the predictors are unrelated to depressive/anxiety disorders. Based on these results we proceeded to estimate a simpler unadjusted model using only asthma severity as a predictor. Results for this model were marginally significant (Wald $F = 3.08$, $df = 1$, $p = .08$). Asthma severity was associated with a higher risk of depressive/anxiety disorder ($OR=1.36$, 95% CI: 0.96, 1.93).

DISCUSSION

Similar to prior island and mainland studies^{4-7, 14, 28} our results showed high rates of asthma and obesity in the population of youth 10 to 19 years in Puerto Rico. We found a strong association between asthma attack and depressive/anxiety disorders among the non-obese in this sample. A new finding was the strong association among females between obesity and depressive/anxiety disorders in a community sample, as opposed to a clinical sample. Most previous studies that reported an association between depressive/anxiety disorders and

obesity referred to samples of extremely obese¹⁷, the chronically obese¹⁸, or obese youth receiving treatment in weight control clinics¹⁹.

The consistency of these results across time and different studies^{10, 14–18} and the high prevalence of asthma and obesity on the island call for the need to identify psychiatric disorders through systematic screening of youth with asthma and/or obesity in primary care clinics in order to provide early treatment interventions for this at risk population.

In separate analyses (not shown), we collapsed overweight and obesity in one category in our models and found no association with weight problems and depressive/anxiety disorders.^{30–31} It was only when the obese group was alone compared with the other weight categories that the association became significant. It is possible that overweight children and youth do not have the same odds for psychiatric disorders as normal weight children and youth, but this is an understudied area. In our sample, however, we do not have the power to detect whether this difference is significant. If this were the case, combining normal/overweight would have attenuated the difference seen between normal/overweight and ‘obese’. Nevertheless, the literature does not support the notion for increased odds for depressive/anxiety disorders in overweight youth from population-based studies. Exploratory analyses with our data also did not support an increased risk in overweight youth.^{17–19}

We had expected a relationship between asthma and obesity. Consistent with prior studies^{8–9} we did find an association between asthma and obesity since 31% of asthmatic youth also were obese. We had also expected that obesity would moderate the relationship between asthma and depressive/anxiety disorders. We found, however, that although obesity moderated the relationship between asthma attacks and depressive/anxiety disorders, having both conditions did not increase the risk of anxiety/depressive disorders beyond what was found for both separate conditions.

Our results also showed that the relationship between obesity and depressive/anxiety disorders was only present among girls and not boys. Other research mostly examining depressive symptoms, instead of disorders, found overweight/obese girls to be at higher odds than boys.^{21, 31} Nevertheless, several other studies have found no gender differences^{29, 32} and still others have found that the risk of depressive symptoms among overweight/obese girls is moderated by body satisfaction.^{20, 33–34} Differences across studies might be due to methodological differences (i.e. use of different measures of obesity and or depression) or may be due to heterogeneity within the obese population or the effect of modifiers in different sub-populations such as gender, ethnicity and weight satisfaction.^{33–34} For example, there is evidence that the mediation effect of body dissatisfaction on the risk for depressive symptoms is only significant in female Latina adolescents with high acculturation levels who have incorporated the US body concept of thinness as a desirable body shape.³⁴ Unfortunately, we did not measure body dissatisfaction. Therefore, it is not possible to ascertain the extent to which body dissatisfaction among other possible explanatory factors, such as discrimination, social isolation and failure to meet socio-cultural norms of body shape and weight^{21, 29} may explain the relationship between obesity and depressive/anxiety disorders in island Puerto Rican girls.

Several other limitations of this study should be noted. First, we included asthma as a unitary diagnosis, without differentiating, the varying prevalence rates of exercise-induced vs. allergen-induced asthma. Therefore, it is unclear whether this group in island Puerto Rico reflects the heterogeneity of asthma, or whether one sub-type is more prevalent among this population. Type of asthma may play a considerable role in the development of

psychopathology and may have a significant influence on the observed rates of depressive and anxiety disorders seen in this population.

Second, our measure of asthma morbidity that is, asthma attack within the last 12 months, is a binary variable (yes/no). It may have been more useful to have had a frequency count that was continuous which could also indirectly speak to the severity of the participant's respiratory condition. There is an ample literature that suggests that psychiatric disorders and symptomatology are more common among youth with more severe or moderate asthma as compared to youth with mild asthma.³⁵ However, we included in our study a measure of parental severity perception of asthma and found in an unadjusted model a marginally significant association between asthma severity and depressive/anxiety disorders in youth.

Third, another limitation of the study was the use of the same instrument, the child and parent DISC IV for ascertaining anxiety/depressive disorders in the 18 to 19 year olds. While there is ample evidence of the reliability and validity of the DISC for children/youth 6 to 17 year old Spanish speaking Puerto Rican participants²³ there is no psychometric data available for the use of this instrument in 18 to 19 year olds. An adult measure of the same instrument of psychopathology would have been preferable, given the expected differences particularly between both age extremes of 10 to 19 year olds and for disorders such as separation anxiety, which is more prevalent among very young children and rarely found in older adolescents and young adults. The originators of the DISC IV have developed a young adult DISC, but the computerized version for this instrument has not been developed in Spanish and for this reason was not used in this study. However, the only difference between the child and adult DISC IV lies in the way that the impairment/distress criterion of DSM IV is ascertained for young adults as opposed to children (one item only). Fourth, weight and height were based on parental report which may under-estimate true weight among girls and overestimate height in boys³⁴ or may be inaccurate due to lack of parental knowledge.^{33, 36} Also, youth 17–19 years of age provided information on their own weight and height, and this reporting may be threatened by susceptibility influences of social desirability, potentially causing underreporting among youth. No measures were used to control for these effects. Accuracy checks of self-reported weight and height (e.g. measured objectively and independently) among youth or controlling by body satisfaction/dissatisfaction measures may improve social desirability limitations in these estimations. Others have proposed this as an explanation for the relationship between depression and obesity.³⁷ The cross sectional design of the study does not permit us to infer causality among asthma, BMI, and depressive/anxiety disorders. However, there is longitudinal evidence that has found that either depressive symptoms or major depressive disorder at baseline predict weight problems such as obesity at follow up^{38–39} and that obesity in girls at baseline predicts depressive and anxiety disorders in young adults.³⁶ Future studies of Latino populations should consider including longitudinal designs and examine the extent to which important variables not included in this study such as body image dissatisfaction, teasing and discrimination may moderate the relationship between obesity and depressive and anxiety disorders in youth. We do not want to imply that these results are “comparable” to mainland or other populations, but we agree that these results pose interesting questions that need to be tested in more diverse populations (e.g. sub-ethnicities).

To our knowledge, this is the first study to examine the co-occurrence of asthma and obesity and depressive/anxiety disorders among island Puerto Rican youth. The relationship found between depressive and anxiety disorders with asthma and obesity has important clinical implications because these conditions can be prevented and/or treated during childhood and can prevent future adult psychiatric disorders.⁴⁰ Preventive interventions geared towards the early identification and treatment of weight and psychiatric problems as well as asthma in youth are necessary in order to prevent the continuity of these conditions into adulthood.

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Figure 1.
Moderation effects of obesity over asthma on depression and/or anxiety disorder.

Figure 2.
Moderation effects of gender over obesity on depression and/or anxiety disorder.

Table 1
Family demographics and youth characteristics by any Anxiety/Depression Disorders among youth

DEMOGRAPHICS	Any Anxiety/Depression (n=72)		No Anxiety nor Depression (n=364)	
	n	% Weighted (95% CI)	n	% Weighted (95% CI) p
YOUTH CHARACTERISTICS				
Gender				0.94
Male	37	50.67 (37.9–63.4)	191	51.15 (45.1–57.2)
Female	35	49.33 (36.6–62.1)	173	48.85 (42.8–54.9)
Mean age [‡]	72	14.92 [‡] (14.3–15.6)	364	14.96 (14.7–15.3) 0.80
Asthma attack				0.06
No	45	69.44 (56.4–79.9)	275	81.23 (76.7–85.0)
Yes	27	30.56 (20.0–43.6)	89	18.77 (14.9–23.2)
Weight				0.33
Underweight	2	2.62 (0.6–11.1)	10	2.75 (1.4–5.2)
Healthy weight	37	50.42 (36.2–64.6)	178	59.12 (51.9–65.9)
Overweight	8	13.99 (6.7–26.8)	59	18.61 (13.9–24.5)
Obese	21	32.96 (21.2–47.3)	64	19.52 (15.1–24.9)
Weight				0.07
Non Obese	47	67.04 (52.7–78.8)	247	80.48 (84.9–68.4)
Obese	21	32.96 (21.2–47.3)	64	19.52 (15.1–24.9)
PERCENTAGES OF COMORBIDITY				
Asthma Attack/Obese	9	8.77 (4.4–16.9)	22	5.74 (3.5–9.4)
Asthma Severity/Obese				
Very Mild	4	11.90 (3.5–33.7)	19	10.72 (6.8–16.4)
Mild	4	7.53 (2.8–18.8)	9	8.41 (4.0–16.5)
Moderate/Severe	7	12.79 (5.7–26.2)	15	8.22 (4.6–14.3)
FAMILY CHARACTERISTICS				
Income				0.69
< 6,000	18	24.11 (14.2–38.1)	76	21.19 (16.4–27.0)
6k–12k	15	18.89 (10.5–31.6)	81	26.13 (20.8–32.1)

DEMOGRAPHICS	Any Anxiety/Depression (n=72)		No Anxiety nor Depression (n=364)		
	n	% Weighted (95% CI)	n	% Weighted (95% CI)	p
12k–25k	17	30.65 (18.9–45.5)	96	27.42 (22.5–32.9)	
> 25k	16	26.25 (15.1–41.6)	82	25.25 (19.9–31.4)	
Perception of poverty [‡]					0.23
Live Poorly	12	12.80 (7.1–22.1)	34	7.36 (5.1–10.5)	
Check to Check	27	40.27 (28.3–53.3)	127	35.70 (29.8–42.1)	
Live well	33	46.93 (34.1–60.1)	198	56.94 (51.0–62.7)	
Household composition [‡]	72	4.19 [‡] (3.9–4.4)	362	4.22 (4.1–4.4)	0.52

Hay un error en el % de mild para no dx es cual debe ser 10.72% en vez de 2.39%.

[‡] Mean

[‡] Primary caregiver can be mother or father, but were mostly mothers (89%) in this sample.

* These analyses were conducted with subpopulation of our sample (n=218 asthma youth) of which only 46 cases were positive for internalizing disorders. We also conducted these analyses by anxiety and depression disorders separately. These results are available upon request.

Table 2

Logistic regression Models for depressive/anxiety disorders and obesity and asthma attack

Models	Predictors variables	Any Depression or Any Anxiety				
		Coeff	SE	p t-test	OR	95% CI
Model 1	Intercept	-2.00	0.18	0.000	0.14	0.09-0.19
	Asthma attack	0.64	0.32	0.044	1.90	1.02-3.56
Model 2	Intercept	-1.92	0.19	0.000	0.15	0.10-0.22
	Child BMI (Obese)	0.71	0.35	0.042	2.03	1.03-4.01
Model 3	Intercept	-2.08	0.21	0.000	0.13	0.08-0.19
	Asthma attack	0.76	0.34	0.029	2.13	1.08-4.20
	Child BMI (Obese)	0.62	0.37	0.096	1.85	0.90-3.84
Model 4	Intercept	-2.20	0.23	0.000	0.11	0.07-0.17
	Asthma attack	1.18	0.38	0.002	3.26	1.55-6.89
	Child BMI (Obese)	1.02	0.43	0.017	2.79	1.20-6.49
	Asthma attack x					
	Child BMI (Obese)	-1.32	0.65	0.043	0.27	0.07-0.96

Table 3

Logistic regression Models for depressive/anxiety disorders and obesity and gender

Models	Predictors variables	Any Depression or Any Anxiety				
		Coeff	SE	p t-test	OR	95% CI
Model 1	Intercept	-1.92	0.19	0.000	0.15	0.10–0.22
	Child BMI (Obese)	0.71	.035	0.042	2.03	1.03–4.01
Model 2	Intercept	-1.85	0.20	0.000	0.16	0.10–0.23
	Gender (Females)	0.02	0.29	0.946	1.02	0.58–1.79
Model 3	Intercept	-1.96	0.28	0.000	0.08	0.08–0.25
	Child BMI (Obese)	0.72	0.36	0.048	2.05	1.01–4.17
	Gender (female)	0.07	0.31	0.824	1.07	0.58–1.98
Model 4	Intercept	-1.73	0.26	0.000	0.18	0.11–0.30
	Child BMI (Obese)	0.00	0.48	0.995	1.00	0.9–2.58
	Gender (female)	-0.38	0.37	0.304	0.68	0.33–1.42
	Child BMI (Obese) x Gender (female)	1.53	0.72	0.035	4.63	1.11–19.32