Published in final edited form as:

Qual Life Res. 2015 August ; 24(8): 1887–1897. doi:10.1007/s11136-015-0922-x.

Perceived health status and cardiometabolic risk among a sample of youth in Mexico

Yvonne N. Flores^{1,2}, Gabriel Q. Shaibi³, Leo S. Morales⁴, Jorge Salmerón², Anne M. Skalicky⁵, Todd C. Edwards⁵, Katia Gallegos-Carrillo², and Donald L. Patrick⁵

¹UCLA Department of Health Policy and Management, Center for Cancer Prevention and Control Research, Fielding School of Public Health and Jonsson Comprehensive Cancer Center, Los Angeles, CA

²Unidad de Investigación Epidemiológica y Servicios de Salud, Instituto Mexicano del Seguro Social, Cuernavaca, Morelos, México

³College of Nursing & Health Innovation, Arizona State University, Phoenix, AZ

⁴Group Health Research Institute, Group Health Cooperative, Seattle, WA

⁵Department of Health Services, School of Public Health, University of Washington, Seattle, WA

Abstract

Purpose—To examine differences in self-reported perceived mental and physical health status (PHS), as well as known cardiometabolic risk factors in a sample of normal weight, overweight, and obese Mexican youths.

Methods—Cross-sectional analysis of 164 youths aged 11–18 years recruited in Cuernavaca, Mexico. Participants completed a self-administered questionnaire that included measures of generic and weight-specific quality of life (QoL), perceived health, physical function, depressive symptoms, and body shape satisfaction. Height, weight and waist circumference were measured and body mass index (BMI) was determined. Fasting blood samples from participants yielded levels of glucose, triglycerides, and cholesterol (total, HDL and LDL).

Results—Nearly 50% of participants were female, 21% had a normal BMI, 39% were overweight, and 40% were obese. Obese youths reported significantly lower measures of PHS and showed an increase in cardiometabolic risk, compared to normal weight youths. Physical functioning, generic and weight-specific QoL were inversely associated with BMI, waist circumference and glucose. Depressive symptoms were positively correlated with BMI, waist circumference, glucose levels and HDL cholesterol. No correlation was found between PHS and cardiometabolic risk measures after controlling for BMI.

Conclusions—In this sample of Mexican youths, obesity was associated with a significantly lower PHS and increased cardiometabolic risk.

*Address for correspondence: Dr. Yvonne Flores, UCLA Department of Health Policy and Management, Center for Cancer Prevention and Control Research, Fielding School of Public Health and Jonsson Comprehensive Cancer Center, Los Angeles, CA, Phone: (310) 825-3903, Fax: 1 (310) 206-3566, ynflores@ucla.edu.

Conflict of interest statement: None of the authors have any financial or personal conflicts of interest.

Keywords

Quality of life; cardiovascular disease; obesity; adolescent; Mexico

Introduction

The high incidence of obesity among youth is one of the most significant public health concerns in Mexico, where over one-third of adolescents are overweight or obese [1]. In the United States (US), 38% of Hispanic youths 12-19 years old are overweight or obese compared to 31% of their non-Hispanic white peers [2]. Overweight youth are more likely to become obese adults [3-5] and are at increased risk for premature obesity-related morbidity and mortality [6-9]. Among adults, obesity is a major risk factor for cardiometabolic diseases, including type 2 diabetes and coronary artery disease. In addition to obesity, other cardiometabolic risk factors such as insulin resistance, dyslipidemia and hypertension are also important predictors of future disease [10, 11] and are more prevalent among overweight and obese youth [12, 13].

Numerous studies have also examined the association between obesity and various self-reported perceived health status (PHS) measures, including general health [14, 15], body shape satisfaction [16-19], physical function [14], depressive symptoms [16, 20-22], and quality of life [14, 23-25]. A potential mechanism explaining the association between obesity status and depressive symptoms, for example, involves physical health, such that adolescents with a higher body mass index (BMI) report significantly lower levels of general health [21,22]. Body shape dissatisfaction has been linked with an increased risk of obesity due to unhealthy weight control practices [26,27]. Other studies report that depressive symptoms are a risk factor for obesity when binge eating is used as a coping mechanism [16,20]. Studies that examined the association between various psychosocial factors and risk of overweight among adolescents found that low life satisfaction, body dissatisfaction, weight concerns, and use of unhealthy weight control behaviors may also increase risk of adolescent overweight [15,16]. Furthermore, obese youth consistently report having a lower quality of life [14,23], which has been found to improve upon weight loss [25]. These studies provide compelling evidence that PHS measures are valid tools for assessing the association between obesity and specific psychological and psychosocial factors.

Research about the relationship between perceived health status (PHS) measures and cardiometabolic risk factors among youth has lagged behind that of adults [28]. Studies of adults have found an association between adverse psychosocial factors and cardiovascular disease [29,30]. A review of the literature by Rozanski *et al.* examined the association between coronary artery disease (CAD) risk and five specific psychosocial domains: (1) depression, (2) anxiety, (3) personality factors and character traits, (4) social isolation, and (5) chronic life stress. They report extensive evidence of the relationship between these psychosocial factors and risk of CAD and provide explanations for the possible behavioral and pathophysiological mechanisms underlying this association [30]. Although several published studies have examined the association between BMI and other PHS measures among adolescents [14-25], no such studies have been conducted with youths in Mexico.

Other factors, such as race/ethnicity and socio-economic status have been closely associated with obesity among youth [31, 32]. In the U.S., disparities exist across racial and ethnic groups with African-American and Mexican-American adolescents ranking highest in prevalence of obesity and overweight [2]. Metabolic dysregulation and PHS are likely to be affected by multiple layers of influence that include individual, social, and familial level characteristics.

For this study, we examined the differences in self-reported perceived mental and physical health status, including self-rated health, depressive symptoms, and quality of life (QoL), as well as known cardiometabolic disease risk factors in a sample of normal, overweight, and obese youths in Mexico. We also explored the association between PHS measures and cardiometabolic risk factors. We hypothesized that: (1) obese youths would report a lower perceived mental and physical health status than normal weight youths; (2) obese youths would be at greater cardiometabolic risk than normal weight youths; and (3) PHS measures would be significantly associated with cardiometabolic risk factors.

Research Methods and Procedures

Study population and data collection procedures

A convenience sample of 181 youths aged 11-18 were recruited from a primary care medical clinic at the Mexican Institute of Social Security (IMSS, by its Spanish abbreviation) in Cuernavaca, Mexico. Study flyers were posted in various areas of the IMSS clinic and potential participants were also informed of the study by staff during their visit to the primary care clinics. Individuals who expressed an interest in the study were contacted by the study recruiter who conducted a telephone interview with the primary caregivers of the potential participants to determine eligibility. Youths who met study inclusion criteria including age, reading ability, and no serious mental health diagnosis were informed that participation in the study would include completing a questionnaire and having their weight, height, and waist circumference measured. Participants were also told that they would receive a series of optional clinical tests if they decided to participate in the study. All study participants were enrolled between March and November of 2008, and informed consent was obtained from each participant and a parent or guardian prior to their inclusion in the study. Specifics regarding the study design, methodology and baseline participant characteristics have been described elsewhere [19,33]. The Institutional Review Boards (IRBs) of all participating institutions approved the protocol and informed consent forms for this study (Seattle Children's Hospital IRB approval number: 11916; IMSS IRB approval number: R-2007-1701-13; UCLA IRB approval number: G06-09-094-01).

All participants completed a self-administered questionnaire that included the 21-item Youth Quality of Life Weight-Specific measure (YQOL-W), a generic Youth Quality of Life Instrument (YQOL-R), as well as measures of perceived general health, physical function, body shape satisfaction and symptoms of depression. Although the PHS measures had not been previously validated for this specific population, they have been used extensively and validated in other studies that have included Latino youth [14,19,25,34-39]. All study materials were designed to be readable and understandable for a 5th grade level. Upon

completion of the questionnaire, study staff checked to make sure that all of the items had been answered to ensure a similar response rate among the participants.

A total of 164 participants also received a standardized clinical examination by trained nurses to determine anthropometric and metabolic measures. Youth were weighed to the nearest 0.1 kg wearing minimal clothing using a calibrated electronic TANITA scale (model BC-533; Tokyo, Japan). Height was measured to the nearest 0.1 cm using a conventional stadiometer while the subjects were standing barefoot, with their shoulders in a normal position. BMI was calculated as weight (kg)/height (m²) using the World Health Organization (WHO) Growth Reference 2007 [40]. Waist circumference was measured to the nearest 0.1 cm at the highest point of the iliac crest at the end of normal exhalation using a measuring tape placed below any clothing, directly touching the participant's skin. Two separate measurements of weight, height, and waist circumference were obtained for each participant, with a third taken if the difference between the first two measures was greater than or equal to 1 cm or 1 kg. The mean of the measurements was used as the final measure.

Blood samples from 164 participants yielded measures of serum glucose, triglycerides, and cholesterol (total, HDL and LDL). Glucose levels were determined using the oxidized glucose method, serum triglyceride concentrations were analyzed with a colorimetric method following enzymatic hydrolysis performed using the lipase technique and cholesterol was analyzed by eliminating chylomicrons followed by catalase, as described elsewhere [41]. A fasting time of eight hours or greater was used for blood collection.

Blood pressure was measured with an automatic digital blood pressure monitor with an adjustable cuff. Participants were seated with their right arm resting at the level of the heart and were asked to sit still without talking for a few minutes before measuring their blood pressure. Three measurements were obtained for each participant.

Cardiometabolic Risk Measures

Body Mass Index (BMI)—Participants were categorized as normal weight, overweight, or obese according to BMI based on the WHO age- and sex-specific BMI cutoff points for youths aged 5 to 19 years [40].

Metabolic Syndrome and its Components—We used the definition proposed by the International Diabetes Federation (IDF), which takes into account several definitions and attempts to provide a unified measure to identify cases of metabolic syndrome [42]. The IDF characterizes metabolic syndrome in youth by the presence of abdominal obesity or a waist circumference (defined as equal to or greater than the 90th percentile, age and sex specific, for those between the ages of 10 to < 16, and 90 cm for males who are 16 years or older, and 80 cm for females who are 16 years and older) and any two or more of the following conditions: concentrations of serum triglycerides 150 mg/dL, high density lipoprotein-cholesterol (HDL-C) < 40 mg/dL for all males and females <16, and < 50 mg/dL for females who are 16 years of age, fasting glucose concentration 100 < 126 mg/dL, and high blood pressure defined as a systolic blood pressure 130 mm Hg or a diastolic blood pressure 85 mm Hg [42]. A result of 170 was considered elevated for total cholesterol and the cut point of 109 was used to define an abnormal result of LDL cholesterol [43].

Other Risk Measures—Continuous measures were also examined for the following cardiometabolic risk factors: waist circumference, fasting glucose, triglycerides, cholesterol (total, HDL and LDL), systolic and diastolic blood pressure.

Perceived Health Status Measures

The following PHS measures were used as well established indicators of mental and physical health: general health, body shape satisfaction, physical functioning, depressive symptoms, generic QoL, and weight-specific QoL. These outcome variables were examined as dichotomous (general health and body shape satisfaction) and continuous (physical functioning, depressive symptoms, generic QoL, and weight-specific QoL). (Table 2) The PHS measures were also explored as dichotomized variables for the multiple logistic regression analyses, based on the results of previous studies [14, 19,25]. This was done in order to explore the association between PHS and QoL measures, with BMI and selected cardiometabolic measures using clinically significant thresholds. (Table 3)

General health—Participants were asked to assess their general health status by responding to the question, “In general, how is your health?” This measure was dichotomized into “good” (excellent, very good, and good) and “poor” (fair and poor) [14].

Body shape satisfaction—Participants were asked to answer the following question from the Body Image & Change Inventory: “How satisfied are you with your body shape?” This measure was dichotomized into “satisfied” (extremely satisfied, fairly satisfied, and neutral) and “dissatisfied” (fairly dissatisfied and extremely dissatisfied) [18].

Physical Function—The Physical Functioning subscale of the Child Health Questionnaire (CHQ) was used to measure functional limitations [14]. Respondents who answered “yes” to any questions concerning functioning were categorized as “limited”.

Depressive Symptoms—The Children's Depression Inventory: Short Version (CDI-S) was used to assess depressive symptoms [35]. The CDI is widely used and has been shown to be a valid and reliable measure of depression among youth in the US and other countries, including Latin America [36, 37]. This measure was dichotomized into “less than average or average symptoms” (Tscore ≤ 55) and “above average symptoms” (Tscore > 55).

Generic Quality of Life—Participants completed items from the generic Youth Quality of Life-Research Version (YQOL-R). The YQOL-R has been previously used in the US and Brazil, with good construct validity, internal consistency, reproducibility, expected associations with other constructs, and ability to distinguish between known groups [38, 39]. Although there is no specific validation for the YQOL-R in Spanish, the questionnaire was translated by a native Spanish speaker from Mexico and was pilot tested prior to its application. All items were administered using an 11-point response scale ranging from 0-10. The items were scored such that 10 indicated the best QoL [39]. The total YQOL-R score was dichotomized into “higher QoL” (≥ 50th percentile) and “lower QoL” (< 50th percentile).

Weight-specific Quality of Life (YQOL-W)—Participants also completed the YQOL-W, a 21-item weight-specific QoL instrument with three domain scores (Sense of Self, Social Life, and Environmental Factors) and a total score. The YQOL-W was developed through qualitative work with a multicultural sample of overweight and obese youth in the US and Mexico. The YQOL-W has established measurement properties, including construct validity, internal consistency, test–retest reliability, and responsiveness to change. The measurement properties of the YQOL-W are described in more detail elsewhere [25,33]. All items were administered using an 11-point response scale ranging from 0–10. Items were scored with 10 indicating the best QoL [33]. Measures for each of the three domains and the total YQOL-W score were dichotomized into “higher QoL” ($\geq 50^{\text{th}}$ percentile) and “lower QoL” ($< 50^{\text{th}}$ percentile).

Statistical Analyses

We restricted our analyses to youths with non-missing questionnaire and clinical data. Our final sample size was $n=164$, after eliminating 17 youth who did not complete the clinical tests. A descriptive analysis of the socio-demographic variables of interest was conducted for the total sample and by BMI status. Differences in sociodemographic characteristics by BMI status were assessed using chi-squared tests for categorical variables and t tests for continuous variables. The PHS results and the cardiometabolic risk measures were also compared by BMI status using chi-squared and t-tests. Skewed continuous variables were log transformed prior to conducting t tests. The Cuzick non-parametric test for trend was also performed to determine any linear association between the study variables and increasing BMI status. The continuous study variables were log transformed to account for the possibility of a non-normal distribution. However, the non-log transformed results are presented since they are practically the same as the log transformed results. Multiple logistic regression models were used to calculate odds ratios and 95% confidence intervals to determine the association between BMI and the cardiometabolic measures to the following outcome variables: poor health, functional limitations, body shape satisfaction, depression, lower generic QoL, and lower weight-specific QoL. These results were adjusted for age as a continuous variable and sex as a categorical variable. All the p-values presented in this analysis are 2-tailed and a p-value <0.05 was considered statistically significant. Data analysis for this paper was carried out using SAS/STAT software, Version 9.2 of the SAS System and STATA 11 for Windows.

Results

Table 1 shows the socio-demographic characteristics of the study population by BMI status. A total of 49% of the participants were female, 21% had a BMI in the normal range, 39% were overweight, and 40% were obese. A significantly higher proportion of the male participants were obese as compared to normal weight. There was also a significantly greater proportion of overweight and obese among females, participants aged between the ages of 11 to 14 years, and those who were in elementary school or junior high. The mean age of the participants was 14.7 years; half were in junior high, 18% were in elementary school, and 32% were in high school. The level of education of the participants' mothers was

lower than the education level of the participants' fathers. Most participants reported that they live in a two-parent household.

Table 2 presents a comparison of the proportions and means reported for each of the PHS and cardiometabolic measures by BMI status. A significantly greater proportion of obese participants reported having poor or fair health than normal-weight participants, and the mean general health score was significantly lower for obese youths than normal-weight youths (3.0 vs. 2.3, respectively, p -value <0.001) (Data not shown). Obese participants were also significantly more likely to indicate that they were dissatisfied with their body shape and have lower physical functioning and weight-specific QoL (YQOL-W) scores than normal-weight participants. Although obese participants reported more depressive symptoms and lower generic QoL scores than normal-weight youths, these differences were not found to be significant. The following significant trends were observed for the PHS measures as BMI increases: a greater proportion of poor/fair health and body dissatisfaction, worse physical functioning, more depressive symptoms, and lower weight-specific QoL.

The means of the cardiometabolic risk measures are also compared by BMI status in Table 2. Overweight and obese youths had a significantly higher mean BMI, waist circumference, glucose and triglyceride levels than normal weight youths. Obese participants also had a significantly higher systolic and diastolic blood pressure than normal weight youths. Although overweight and obese participants had a lower mean HDL and a higher mean LDL and total cholesterol than normal weight youths, these differences were not found to be significant. Significant trends were observed for the following cardiometabolic measures as BMI increases: larger waist circumference, higher glucose and triglyceride levels, as well as a greater systolic and diastolic blood pressure. (Table 2)

Table 3 presents the association between perceived health measures, BMI, and selected cardiometabolic measures, controlling for age and sex. Obese youth were nearly five times more likely to report having poor or fair health and had 5.6 times greater odds of being dissatisfied with their body shape than normal weight youth. Obese participants also had almost four times greater odds of having lower self YQOL-W scores and a nearly six-fold higher odds of having lower social, environment, and total YQOL-W scores than normal weight participants. Participants with abdominal obesity were almost three times more likely to report having poor or fair health, their odds of being dissatisfied with their body shape were 3.6 times greater, and they had four times higher odds of depression than normal weight youth. Participants with abdominal obesity also had a threefold greater odds of having lower self, social, environment, and total YQOL-W scores than normal weight participants. Youth with elevated glucose levels were 4.5 times more likely to report dissatisfaction with their body and were twice as likely to have lower social, environment, and total YQOL-W scores. The presence of metabolic syndrome was associated with a two-fold higher odds of reporting poor or fair health, body dissatisfaction, and having lower self YQOL-W scores.

Discussion

Our results corroborate those of other studies, which report that certain psychological comorbidities such as lower health status, depression, low self-esteem, poor school/social functioning, and decreased QoL are associated with obesity [14,15,23,24,44-50]. Compared with normal-weight youths, obese youths in our study were more likely to report poor health, dissatisfaction with their body shape, and lower weight-specific QoL scores. Obese youths also had a worse cardiometabolic risk profile than the normal weight youths.

A review of 22 cross-sectional and population-based studies reports that obese youth have reduced overall health-related QoL, as compared with their normal weight counterparts [51]. Obesity has been shown to have a negative impact on the QoL of youth in terms of lower levels of physical functioning [14,23,44-46,50] and on the psychosocial aspects of their life [14,23,44,46,49,50]. Adverse psychosocial conditions may also lead to a higher frequency of unhealthy behaviors such as poor diet and smoking, as well as other direct pathophysiological mechanisms including neuroendocrine response, coronary vasoconstriction and platelet activation [30].

Our findings indicate that after controlling for age and sex, participants with abdominal obesity, elevated blood glucose levels, or metabolic syndrome had a significantly greater risk of reporting a poor PHS and lower YQOL-W scores. Some PHS measures were also correlated with certain cardiometabolic risk factors. Decreased physical functioning, lower generic and weight-specific QoL, and more symptoms of depression were significantly correlated with increasing BMI, waist circumference, and glucose levels. A decrease in weight-specific QoL was significantly correlated with increasing triglycerides, and the presence of depression symptoms was positively correlated with HDL. After adjusting for BMI, these results were no longer found to be significant, although the direction of the associations was maintained. (Data not shown) An explanation for this may be that BMI is a known intermediate factor in the causal pathway for cardiometabolic disease. These findings suggest that BMI moderates the association between perception of mental and physical health and actual measured cardiometabolic health. These results support those of other studies, which indicate that obese youth experience more mental and physical symptoms [14,21,44,46,49-51] and suggest that PHS measures may serve as an additional indicator or red flag for that more medical follow-up may be required for at-risk obese youth.

Finding alternative ways to prevent and treat obesity-related metabolic and psychosocial comorbidities including insulin resistance, depression, and reduced QoL is very important due to the worldwide obesity epidemic. This is especially true among Latino youth who are 1.2-1.8 times more likely to be obese than Caucasian youth [2, 52]. Our findings may have practical implications for identifying youth who need more intensive clinical weight management or psychosocial intervention. There are numerous psychosocial conditions and problems that pose threats to children and adolescents [53] and preventive interventions that promote cardiometabolic health among obese youth could benefit from incorporating psychosocial approaches.

Studies consistently show that obese children will likely maintain their obese BMI into adulthood [3-5, 54]. Programs are therefore needed to prevent this progression. By addressing childhood obesity early, harmful physiological and psychosocial lifestyle habits can be broken before they become ingrained [55]. To have the desired effect, these interventions must be culturally specific in order to respond to the unique needs of the target population. Understanding the perspective and risk factors of obese youth in Mexico is a crucial first step, but more studies will be needed to best tailor such an intervention.

Research aimed at informing such an intervention will be of great use in both Mexico and the US. Studies show that obesity-related illnesses limit Mexico's economic competitiveness by increasing medical care costs and reducing the productivity of the work force [56]. Since the economies of the US and Mexico are so closely intertwined, these effects are not confined to Mexico alone. Developing programs and interventions to prevent obesity that could be applied to Mexicans in both countries could be mutually beneficial in terms of resource sharing and cost savings. This is especially important in light of the fact that Mexican-Americans and Mexican immigrants in the US are more likely to be obese than their Mexican peers [57]. It is therefore important to gain a better understanding of the causes and risk factors involved in this epidemic in order to extend these programs more widely.

This study has some important limitations, including the fact that it was an exploratory study conducted using a small convenience sample that was not population-based. Our study sample is not representative of the Mexican population as a whole, and our results should be analyzed with caution due to the possibility of selection bias. This sample consists of Mexican mestizo youth who have IMSS medical insurance and better access to health care, on average, than the general population. This sample may be considered representative of seemingly healthy youth from middle-income to low-income families residing in urban areas of central Mexico, which accounts for approximately 32% of the population [1,58]. The prevalence of overweight and obesity in our study sample (39% and 40%, respectively) was higher than in the general population, which is approximately 35% [1]. Although equal numbers of normal, overweight and obese youth completed the self-reported questionnaires, a lower proportion of normal weight youth returned for the clinical examination, and were thus excluded from the study.

Several of the associations that were not statistically significant in this analysis, e.g. the relationship between certain PHS and cardiometabolic measures, may prove significant with a larger sample size. Due to sample size limitations, we were unable to explore the following relationships: (1) obesity and poor PHS; (2) obesity and higher cardiometabolic risk; and (3) poor PHS and cardiometabolic risk, in a more comprehensive model. Future research should further explore the relationship between metabolic dysregulation, health status and weight-specific QoL in a larger, more representative sample of obese youths. Despite these limitations, this is the first study to compare the self-reported PHS and risk factors for cardiometabolic disease in a sample of normal-weight, overweight, and obese youths in Mexico. This study has several strengths, including the use of a new weight-specific QoL instrument that was developed for use in Mexico [33]. Additionally, we used an inclusive approach that examined self-reported PHS as well as known cardiometabolic risk factors.

In conclusion, our results are consistent with other studies that have demonstrated that obesity is associated with a lower PHS and an increase in cardiometabolic risk. Intervention programs that combine a psychosocial and physiological approach are sorely needed in order to help combat the obesity epidemic in Mexico. Additionally, the information obtained from this study suggests that PHS measures may be used to identify Mexican youth who are at greater cardiometabolic risk, but this finding needs to be examined and validated in larger samples.

Acknowledgments

This research was supported by a grant from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) awarded to Dr. Patrick (grant number 1 R01 DK071101-01A2), and an NIDDK Research Supplement to Promote Diversity in Health-Related Research Grant awarded to Dr. Flores (grant number: 3R01DK071101-02S1). Additional support was provided by the Epidemiological and Health Services Research Unit of the Mexican Institute of Social Security. The authors would like to thank Lee Barr, Alan Kuniyuki, Paula Ramirez and Zuelma Arellano Esquivel for providing statistical support.

References

1. Gutiérrez, JP.; Rivera-Dommarco, J.; Shamah-Levy, T.; Villalpando-Hernández, S.; Franco, A.; Cuevas-Nasu, L., et al. Resultados Nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública (MX); 2012. Encuesta Nacional de Salud y Nutrición 2012. Available at: <http://ensanut.insp.mx/informes/ENSANUT2012ResultadosNacionales.pdf> [Accessed December 2014]
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*. 2014; 311(8):806–14. [PubMed: 24570244]
3. Guo SS, Wu W, Chumlea WC, Roche AF. Predicting overweight and obesity in adulthood from body mass index values in childhood and adolescence. *Am J Clin Nutr*. 2002; 76:653–658. [PubMed: 12198014]
4. Lake JK, Power C, Cole TJ. Child to adult body mass index in the 1958 British birth cohort: associations with parental obesity. *Arch Dis Child*. 1997; 77:376–381. [PubMed: 9487953]
5. Whitaker RC, Pepe MS, Wright JA, Seidel KD, Dietz WH. Early adiposity rebound and the risk of adult obesity. *Pediatrics*. 1998; 101:E5. [PubMed: 9481024]
6. Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, et al. Overweight in Children and Adolescents: Pathophysiology, Consequences, Prevention, and Treatment. *Circulation*. 2005; 111(15):1999–2012. [PubMed: 15837955]
7. Franks PW, Hanson RL, Knowler WC, Sievers ML, Bennett PH, Looker HC. Childhood obesity, other cardiovascular risk factors, and premature death. *N Engl J Med*. 2010; 362(6):485–93. [PubMed: 20147714]
8. Baker JL, Olsen LW, Sørensen TI. Childhood body-mass index and the risk of coronary heart disease in adulthood. *N Engl J Med*. 2007; 357(23):2329–2337. [PubMed: 18057335]
9. Steinberger J, Daniels SR, Eckel RH, Hayman L, Lustig RH, McCrindle B, et al. Progress and Challenges in Metabolic Syndrome in Children and Adolescents: A Scientific Statement From the American Heart Association Atherosclerosis, Hypertension, and Obesity in the Young Committee of the Council on Cardiovascular Disease in the Young; Council on Cardiovascular Nursing; and Council on Nutrition, Physical Activity, and Metabolism. *Circulation*. 2009; 119:628–647. [PubMed: 19139390]
10. Brunzell JD, Davidson M, Furberg CD, Goldberg RB, Howard BV, Stein JH, et al. Lipoprotein management in patients with cardiometabolic risk: consensus statement from the American Diabetes Association and the College of Cardiology Foundation. *Diabetes Care*. 2008; 31:811–822. [PubMed: 18375431]
11. Freedman DS, Khan LK, Dietz WH, Srinivasan SR, Berenson GS. Relationship of Childhood Obesity to Coronary Heart Disease Risk Factors in Adulthood: The Bogalusa Heart Study. *Pediatrics*. 2001; 108(3):712–8. [PubMed: 11533341]

12. Weiss R, Dziura J, Burgert TS, Tamborlane WV, Taksali SE, Yeckel CW, et al. Obesity and the metabolic syndrome in children and adolescents. *N Engl J Med*. 2004; 350:2362–2374. [PubMed: 15175438]
13. Thompson DR, Obarzanek E, Franko DL, Barton BA, Morrison J, Biro FM, et al. Childhood Overweight and Cardiovascular Disease Risk Factors: The National Heart, Lung, and Blood Institute Growth and Health Study. *J Pediatr*. 2007; 150(1):18–25. [PubMed: 17188606]
14. Swallen KC, Reither EN, Haas SA, Meier AM. Overweight, obesity, and health-related quality of life among adolescents: the National Longitudinal Study of Adolescent Health. *Pediatrics*. 2005; 115:340–347. [PubMed: 15687442]
15. Heshmat R, Kelishadi R, Motamed-Gorji N, Motlagh ME, Ardalan G, Arifirad T, et al. Association between body mass index and perceived weight status with self-rated health and life satisfaction in Iranian children and adolescents: the CASPIAN-III study. *Qual Life Res*. 2014 Jul 20. Epub ahead of print.
16. Haines J, Neumark-Sztainer D, Wall M, Story M. Personal, Behavioral, and Environmental Risk and Protective Factors for Adolescent Overweight. *Obesity*. 2007; 15:2748–2760. [PubMed: 18070766]
17. Vander Wal JS. Unhealthy weight control behaviors among adolescents. *J Health Psychol*. 2011; 17(1):110–120. [PubMed: 21652614]
18. McCabe MP, Ricciardelli LA. Sociocultural influences on body image and body changes among adolescent boys and girls. *J Soc Psychol*. 2003 Feb; 143(1):5–26. [PubMed: 12617344]
19. Edwards TC, Patrick DL, Skaliky AM, Huang Y, Hobby AD. Perceived body shape, standardized body-mass index, and weight-specific quality of life of African-American, Caucasian, and Mexican-American adolescents. *Qual Life Res*. 2012; 21:1101–1107. [PubMed: 21960291]
20. Stice E, Presnell K, Shaw H, Rohde P. Psychological and behavioral risk factors for obesity onset in adolescent girls: a prospective study. *J Consult Clin Psychol*. 2005; 73:195–202. [PubMed: 15796626]
21. Needham BL, Crosnoe R. Overweight status and depressive symptoms during adolescence. *J Adol Health*. 2005; 36:48–55.
22. Goodman E, Whitaker RC. A prospective study of the role of depression in the development and persistence of adolescent obesity. *Pediatrics*. 2002; 110(3):497–504. [PubMed: 12205250]
23. Tyler C, Johnston CA, Fullerton G, Foreyt JP. Reduced quality of life in very overweight Mexican-American adolescents. *J Adolesc Health*. 2007; 40:366–368. [PubMed: 17367735]
24. Hayward J, Millar L, Petersen S, Swinburn B, Lewis AJ. When ignorance is bliss: weight perception, body mass index and quality of life in adolescents. *Int J Obes (Lond)*. 2014 May 14. Epub ahead of print. 10.1038/ijo.2014.78
25. Patrick DL, Skaliky AM, Edwards TC, Kuniyuki A, Morales LS, Leng M, et al. Weight loss and changes in generic and weight-specific quality of life in obese adolescents. *Qual Life Res*. 2010; 20:961–965. [PubMed: 21188537]
26. Strauss R. Self-reported weight status and dieting in a cross-sectional sample of young adolescents. *Arch Pediatr Adolesc Med*. 1999; 153:741–747. [PubMed: 10401809]
27. Chung AE, Perrin EM, Skinner AC. Accuracy of child and adolescent weight perceptions and their relationships to dieting and exercise behaviors: a NHANES study. *Academic Pediatrics*. 2013; 13:371–378. [PubMed: 23830022]
28. Grant KE, Compas BE, Stuhlmacher AF, Thurm AE, McMahon SD, Halpert JA. Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychol Bull*. 2003; 129(3):447–466. [PubMed: 12784938]
29. Hemingway H, Marmot M. Evidence based cardiology: psychosocial factors in the aetiology and prognosis of coronary heart disease. Systematic review of prospective cohort studies. *BMJ*. 1999; 318(7196):1460–1467. [PubMed: 10346775]
30. Rozanski A, Blumenthal JA, Kaplan J. Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. *Circulation*. 1999; 99(16):2192–2217. [PubMed: 10217662]

31. Heidi Ullmann S, Buitenheim AM, Goldman N, Pebley AR, Wong R. Socioeconomic differences in obesity among Mexican adolescents. *Int J Pediatr Obes.* 2011; 6(2-2):e373–380. [PubMed: 20883181]
32. Goodman E, Slap GB, Huang B. The public health impact of socioeconomic status on adolescent depression and obesity. *Am J Public Health.* 2003; 93(11):1844–50. [PubMed: 14600051]
33. Morales L, Edwards T, Flores Y, Barr L, Patrick DL. Measurement Properties of a Multicultural Weight-Specific Quality of Life Instrument for Youth. *Qual Life Res.* 2011; 20(2):215–224. [PubMed: 20820926]
34. Patrick DL, Edwards TC, Topolski TD. Adolescent quality of life, part II: initial validation of a new instrument. *J Adolesc.* 2002 Jun; 25(3):287–300. [PubMed: 12128039]
35. Kovacs, M. *Children's Depression Inventory (CDI)*. North Tonawanda, NY: Multi-Health Systems; 1992.
36. Molina CS, Gómez JR, Pastrana MC. Psychometric properties of the Spanish-language child depression inventory with Hispanic children who are secondary victims of domestic violence. *Adolescence.* 2012; 44(173):133–48. [PubMed: 19435171]
37. Segura Camacho S, Posada Gomez S, Ospina ML, Ospina Gomez H. Inventory Standardization of Children Depression scale for adolescents aged 12 and 17 years of age, in the Municipality of Sabaneta, Department Antioquia, Colombia. *Int J Psychological Research.* 2010; 3(2):63–73.
38. Salum GA, Patrick DL, Isolan LR, Manfro GG, Fleck MP. Youth Quality of Life Instrument-Research version (YQOL-R): psychometric properties in a community sample. *J Pediatr.* 2012; 88(5):443–448.
39. Patrick DL, Edwards TC, Topolski TD. Adolescent quality of life, part II: Initial validation of a new instrument. *J Adolesc.* 2002; 25(3):287–300. [PubMed: 12128039]
40. de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ.* 2007; 85:660–667. [PubMed: 18026621]
41. Halley Castillo E, Borges G, Talavera JO, Orozco R, Vargas-Alemán C, Huitrón-Bravo G, et al. Body mass index and the prevalence of metabolic syndrome among children and adolescents in two Mexican populations. *J Adolesc Health.* 2007; 40:521–526. [PubMed: 17531758]
42. Zimmet P, Alberti KG, Kaufman F, Tajima N, Silink M, Arslanian S, et al. The metabolic syndrome in children and adolescents – an IDF consensus report. *Pediatric Diabetes.* 2007; 8:299–306. [PubMed: 17850473]
43. Daniels SR, Greer FR. Lipid screening and cardiovascular health in childhood. *Pediatrics.* 2008; 122:198–208. [PubMed: 18596007]
44. Pinhas-Hamiel O, Singer S, Pilpel N, Fradkin A, Modan D, Reichman B. Health-related quality of life among children and adolescents: associations with obesity. *Int J Obes.* 2006; 30:267–272.
45. Kolotkin RL, Zeller M, Modi AC, Samsa GP, Quinlan NP, Yanovski JA, et al. Assessing weight-related quality of life in adolescents. *Obesity.* 2006; 14:448–457. [PubMed: 16648616]
46. de Beer M, Hofsteenge GH, Koot HM, Hirasing RA, Delemarre-van de Waal HA, Gemke RJ. Health-related-quality-of-life in obese adolescents is decreased and inversely related to BMI. *Acta Paediatr.* 2007; 96:710–714. [PubMed: 17381471]
47. Arif AA, Rohrer JE. The relationship between obesity, hyperglycemia symptoms, and health-related quality of life among Hispanic and non-Hispanic white children and adolescents. *BMC Fam Pract.* 2006; 7:3. [PubMed: 16417628]
48. Keating CL, Moodie ML, Swinburn BA. The health-related quality of life of overweight and obese adolescents - a study measuring body mass index and adolescent-reported perceptions. *Int J Pediatr Obes.* 2011; 6(5-6):434–441. [PubMed: 21774577]
49. Janicke DM, Marciel KK, Ingerski LM, Novoa W, Lowry KW, Sallinen BJ, et al. Impact of psychosocial factors on quality of life in overweight youth. *Obesity.* 2007; 15(7):1799–1807. [PubMed: 17636099]
50. Schwimmer JB, Burwinkle TM, Varni JW. Health-related quality of life of severely obese children and adolescents. *JAMA.* 2003; 289:1813–1819. [PubMed: 12684360]
51. Tsiros MD, Olds T, Buckley JD, Grimshaw P, Brennan L, Walkley J, et al. Health-related quality of life in obese children and adolescents. *Int J Obes.* 2009; 33(4):387–400.

52. Davis JN, Ventura EE, Shaibi GQ, Byrd-Williams CE, Alexander KE, Vanni AK, et al. Interventions for improving metabolic risk in overweight Latino youth. *Int J Pediatr Obes*. 2010; 5(5):451–455. [PubMed: 20387989]
53. Dockray S, Susman EJ, Dorn LD. Depression, cortisol reactivity and obesity in childhood and adolescence. *J Adolesc Health*. 2009; 45:344–350. [PubMed: 19766938]
54. Dietz WH. Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics*. 1998; 101(3 Pt 2):518–525. [PubMed: 12224658]
55. Misra A, Khurana L. Obesity and the metabolic syndrome in developing countries. *J Clin Endocrinol Metab*. 2008; 93(11 Suppl 1):S9–30. [PubMed: 18987276]
56. Popkin BM. Is the obesity epidemic a national security issue around the globe? *Curr Opin Endocrinol Diabetes Obes*. 2011; 18(5):328–331. [PubMed: 21543976]
57. Hernández-Valero MA, Bustamante-Montes LP, Hernández M, Halley-Castillo E, Wilkinson AV, Bondy ML, et al. Higher Risk for Obesity Among Mexican-American and Mexican Immigrant Children and Adolescents than Among Peers in Mexico. *J Immigr Minor Health*. 2012; 14(4):517–22. [PubMed: 22002704]
58. Instituto Mexicano de Estadística y Geografía (INEGI). [Accessed: December 2014] Población Hogares y Vivienda. 2010. Available at: <http://www3.inegi.org.mx/sistemas/temas/default.aspx?s=est&c=17484>

Table 1
Sociodemographic characteristics of the study sample by BMI Status. n (%)

	Total n = 164	Normal n = 35	Overweig ht n = 63	Obese n = 66	P _{overweight} [†]	P _{obese} [†]
Sex						
Male	84 (51.2)	21 (60.0)	30 (47.6)	33 (50.0)	0.1312	0.0474
Female	80 (48.8)	14 (40.0)	33 (52.4)	33 (50.0)	0.0010	0.0010
Age (years)						
11 – 14	92 (56.1)	15 (42.9)	40 (63.5)	37 (56.1)	0.0001	0.0003
15 – 18	72 (43.9)	20 (57.1)	23 (36.5)	29 (43.9)	0.5855	0.1134
Mean Age ± SD	14.7 ± 2.3	15.3 ± 2.1	14.5 ± 2.2	14.7 ± 2.3	0.0757	0.1964
Education Level						
Elementary school (6 th grade)	31 (18.9)	2 (5.7)	16 (25.4)	13 (19.7)	0.0001	0.0011
Junior high (7 th – 9 th grade)	81 (49.4)	16 (45.7)	31 (49.2)	34 (51.5)	0.0094	0.0022
High school (10 th – 12 th grade)	52 (31.7)	17 (48.6)	16 (25.4)	19 (28.8)	0.8334	0.6799
Education Level of Mother						
< High school	93 (57.1)	20 (57.1)	33 (53.2)	40 (60.6)	0.0348	0.0017
High school graduate	50 (30.7)	12 (34.3)	21 (33.9)	17 (25.8)	0.0556	0.2705
Some university	5 (3.1)	1 (2.9)	2 (3.2)	2 (3.0)	0.4902	0.4902
University or higher	15 (9.2)	2 (5.7)	6 (9.7)	7 (10.6)	0.0986	0.0463
Education Level of Father						
< High school	80 (51.3)	15 (45.5)	31 (50.8)	34 (54.8)	0.0052	0.0011
High school graduate	38 (24.4)	13 (39.4)	14 (23.0)	11 (17.7)	0.8107	0.6218
Some university	12 (7.7)	2 (6.1)	2 (3.3)	8 (12.9)	1.0	0.0130
University or higher	26 (16.7)	3 (9.1)	14 (23.0)	9 (14.5)	0.0011	0.0483
Family Structure						
2-parent family	121 (74.2)	24 (68.6)	44 (71.0)	53 (80.3)	0.0042	0.0001
1-parent family [‡]	42 (25.8)	11 (31.4)	18 (29.0)	13 (19.7)	0.1081	0.6292

[†] Differences between proportions were performed using chi-square tests of homogeneity

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

² Differences between means were performed using t-tests. No adjustments were made for multiple comparisons.

[†] Includes 2 cases where youth lives with no adult parent or guardian, but lives with other relatives.

Sample sizes within characteristics may not add up to marginal totals due to missing values.

Table 2
Comparison of perceived health status and cardiometabolic measures by BMI status (n= 164)

Categorical Perceived Health Status	Normal*		Overweight		Obese		$P_{\text{overweight}}^1$		P_{obese}^1		P_{trend}^3	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)						
General Health - Poor/Fair	11 (31.4)		30 (47.6)		45 (68.2)		0.12		<0.001		<0.001	
Body shape satisfaction - Dissatisfied	14 (40.0)		33 (52.4)		52 (78.8)		0.24		<0.001		<0.001	
Continuous Perceived Health Status	Normal*		Overweight		Obese		$P_{\text{overweight}}^2$		P_{obese}^2		P_{trend}^3	
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD						
Physical Functioning	92.9 $\pm$ 7.4	87.7 $\pm$ 17.4	87.4 $\pm$ 10.7				0.09		0.01		0.01	
Depression Symptoms	48.6 $\pm$ 8.8	51.0 $\pm$ 10.2	52.2 $\pm$ 9.7				0.25		0.07		0.04	
YQoL-Generic	78.7 $\pm$ 15.4	78.9 $\pm$ 14.3	76.2 $\pm$ 13.2				0.95		0.42		0.17	
YQoL-Weight	76.7 $\pm$ 27.8	65.2 $\pm$ 26.0	50.8 $\pm$ 27.1				0.04		<0.001		<0.001	
Cardiometabolic Risk Factors												
BMI (Kg/m ²)	21.2 $\pm$ 1.6	25.3 $\pm$ 1.9	33.2 $\pm$ 4.2				<0.001		<0.001		<0.001	
Waist circumference (cm)	79.4 $\pm$ 5.9	88.7 $\pm$ 5.0	104.9 $\pm$ 10.1				<0.001		<0.001		<0.001	
Glucose (mg/dL)	88.1 $\pm$ 7.6	93.3 $\pm$ 10.5	95.5 $\pm$ 9.4				0.01		<0.001		0.001	
Triglycerides (mg/dL)	124.3 $\pm$ 65.8	155.0 $\pm$ 79.2	167.7 $\pm$ 82.0				0.05		0.008		0.007	
HDL Cholesterol (mg/dL)	35.8 $\pm$ 9.7	35.3 $\pm$ 9.6	35.0 $\pm$ 8.4				0.80		0.68		0.94	
Cholesterol (mg/dL)	153 $\pm$ 29.1	158.8 $\pm$ 32.5	163.0 $\pm$ 31.4				0.39		0.12		0.15	
LDL Cholesterol (mg/dL)	97.6 $\pm$ 24.3	102.7 $\pm$ 25.9	106.2 $\pm$ 25.8				0.35		0.11		0.085	
Systolic Blood Pressure (mmHg)	108.5 $\pm$ 10.3	107.6 $\pm$ 8.5	116.8 $\pm$ 8.9				0.67		<0.001		<0.001	
Diastolic Blood Pressure (mmHg)	65.4 $\pm$ 7.3	66.0 $\pm$ 6.4	70.8 $\pm$ 8.5				0.69		0.003		0.001	

Abbreviations: YQoL-Generic, Generic Youth Quality of Life Measure, YQoL-Weight, Youth Quality of Life Weight-Specific measure.

* Reference category for comparisons between BMI status groups.

¹ Differences between proportions were assessed using chi-square tests of homogeneity.

² Differences between means were assessed using t-tests. Skewed variables were log-transformed prior to conducting t-tests. No adjustments were made for multiple comparisons.

³ Cuzick's Test for Trend

Table 3
Adjusted Odds Ratios and 95% CI for Perceived Health Status and QoL Outcomes, by BMI and Selected Cardiometabolic Measures*

	Total n (%)	Poor/F air Health	Function al Limitatio ns	Dissatisfi ed Body Image	Depressi on	YQOL-R Total	YQOL-W Self	YQOL-W Soci al	YQOL-W Environm ent	YQOL-W L-W Total
Body Mass Index (BMI)										
Healthy weight	35(21.4)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Overweight	63(38.4)	1.7 (0.7, 4.2)	1.1 (0.4, 2.7)	1.4 (0.6, 3.5)	1.9 (0.6, 6.4)	0.8 (0.3, 1.8)	0.8 (0.7, 4.6)	1.5 (0.6, 3.9)	1.6 (0.6, 4.4)	1.9 (0.8, 5.1)
Obese	66(40.2)	4.7 (1.9,12.1)	2.0 (0.7, 5.4)	5.6 (2.2, 14.9)	2.7 (0.9, 9.2)	1.5 (0.7, 3.6)	3.7 (1.5, 9.5)	5.9 (2.4, 15.5)	5.9 (2.3, 16.1)	5.8 (2.3, 15.6)
Cholesterol (mg/dL)										
Normal (< 170)	110(67.1)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High (≥ 170)	54(32.9)	1.5 (0.8, 3.1)	0.9 (0.4, 2.1)	1.9 (0.9, 4.0)	1.8 (0.9, 3.8)	1.6 (0.8, 3.1)	1.2 (0.6, 2.4)	1.4 (0.7, 2.9)	1.4 (0.7, 2.8)	1.4 (0.7, 2.7)
LDL Cholesterol (mg/dL)										
Normal (< 109)	100(61.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High (≥ 109)	64(39.0)	1.3 (0.7, 2.6)	1.3 (0.6, 2.8)	2.3 (1.1, 4.7)	1.8 (0.9, 3.6)	1.1 (0.6, 2.0)	1.5 (0.8, 2.9)	1.7 (0.9, 3.2)	1.6 (0.8, 3.0)	1.6 (0.8, 3.1)
HDL Cholesterol (mg/dL)¹										
Normal	43(26.2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Abnormal	121(73.8)	1.0 (0.5, 2.1)	1.3 (0.6, 3.0)	1.0 (0.5, 2.1)	0.4 (0.2, 0.9)	0.7 (0.3, 1.4)	0.8 (0.4, 1.6)	0.6 (0.3, 1.3)	0.8 (0.4, 1.6)	0.6 (0.3, 1.2)
Waist Circumference (cm)²										
Normal	38(23.2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High	126(76.8)	2.9 (1.3, 6.7)	1.9 (0.8,4.6)	3.6 (1.6, 8.4)	4.4 (1.4, 19.5)	1.1 (0.5, 2.4)	3.5 (1.5, 8.7)	3.4 (1.5, 8.0)	3.6 (1.6, 9.1)	3.0 (1.3, 7.1)
Glucose (mg/dL)										
Normal (< 100)	118(72.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High (≥ 100)	46(28.0)	1.9 (0.9, 4.0)	2.3 (0.9, 6.5)	4.5 (1.9, 11.4)	1.6 (0.7, 3.4)	1.5 (0.8, 3.1)	1.9 (0.9, 3.8)	2.7 (1.3, 5.9)	2.4 (1.1, 5.0)	2.9 (1.4, 6.3)
Triglycerides (mg/dL)										
Normal (<150)	96 (58.5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
High (≥ 150)	68 (41.5)	1.8 (0.9, 3.5)	1.4 (0.7, 3.2)	1.9 (0.9, 3.8)	1.7 (0.9, 3.6)	1.4 (0.8, 2.7)	1.4 (0.7, 2.6)	1.5 (0.8, 2.8)	2.0 (1.0, 3.8)	1.6 (0.8, 3.1)

	Total n (%)	Poor/F Air Health	Function al Limitatio ns	Dissatisfi ed Body Image	Depressi on	YQO L-R Total	YQO L-W Self	YQO L-W Soci al	YQOL-W Environm ent	YQO L-W Total
Blood Pressure (mm Hg) ³										
	138(95.2)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	7(4.8)	1.2 (0.3, 6.7)	0.4 (0.1, 2.1)	1.0 (0.2, 5.5)	0.4 (0.02, 2.5)	0.7 (0.1, 3.4)	0.8 (0.1, 4.0)	0.7 (0.1, 3.5)	0.8 (0.1, 4.0)	0.7 (0.1, 3.6)
Metabolic Syndrome ⁴										
	92(59.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Yes	64(41.0)	2.5 (1.3, 5.0)	1.8 (0.8,4.2)	2.7 (1.3, 5.6)	1.3 (0.6, 2.7)	1.1 (0.6, 2.1)	2.0 (1.0, 4.0)	1.4 (0.7, 2.8)	1.9 (1.0, 3.7)	1.5 (0.8, 2.9)

* Adjusted for age and sex.

¹ Elevated HDL: < 40 mg/dL in males; < 40 mg/dL in females ages 10 - <16 years; < 50 mg/dL in females 16 years of age and over.

² High waist circumference: 90th percentile or adult cut-off, if lower, for ages 10 - <16 years; 90 cm (80 cm) for males (females) 16 years of age and over.

³ Elevated blood pressure (BP): Systolic BP 130 mm Hg, or diastolic BP 85 mm Hg.

⁴ Metabolic syndrome: Presence of central obesity (abnormal waist circumference), plus any two of the following four factors: abnormal HDL, high glucose, high triglycerides, high blood pressure.

Significant odds ratios are typed in **bold** font (p < 0.05). Profile-likelihood confidence intervals are reported for odds ratios.