

BRIEF

High Prevalence of Obesity Among Inner-City Adolescent Boys in the Bronx, New York: Forgetting Our Boys

Carmen R. Isasi, MD, PhD; Amy Whiffen; Eleanor Campbell; Yolanda Florez; Katherine Freeman; Judith Wylie-Rosett

Suggested citation for this article: Isasi CR, Whiffen A, Campbell E, Florez Y, Freeman K, Wylie-Rosett J. High prevalence of obesity among inner-city adolescent boys in the Bronx, New York: forgetting our boys. *Prev Chronic Dis* 2011;8(1). http://www.cdc.gov/pcd/issues/2011/jan/10_0009.htm. Accessed [date].

PEER REVIEWED

Abstract

We examined sex differences in overweight and obesity in a sample of 1,619 inner-city adolescents. Participants were enrolled from 11 public schools in the Bronx, New York. The prevalence of overweight and obesity was 21.7% and 22.5%, respectively; prevalence of obesity was significantly higher among adolescent boys than adolescent girls (24.9 vs 20.1%). Childhood obesity is a public health concern in the United States, and the higher prevalence of obesity in adolescent boys requires additional attention.

Objective

Childhood obesity is a growing concern in the United States. Data from the third National Health and Nutrition Examination Survey show that excess weight is associated with metabolic abnormalities such as dyslipidemia and insulin resistance (1). National surveys have reported a prevalence of overweight and of obesity of 34% and 18%, respectively, among youth aged 12 to 19 years (2). Low-income and minority youth, particularly Hispanics and African Americans, are the most affected (2-5).

Findings from recent studies challenge the common assumption that girls are at higher risk of overweight and obesity than boys (5,6). Among Mexican American adolescents, boys also have a higher prevalence of obesity than girls (6). A recent analysis of data from the National Longitudinal Study of Adolescent Health (Add Health), a national representative sample of adolescents in grades 7 through 12, found that during early adolescence, boys have a higher body mass index (BMI) than girls, although girls have a faster increase in BMI over the years (7). This disparity appears to persist as teenagers get older, but by age 20 the prevalence of obesity in adolescent girls gets closer to or higher than that of boys (6,7). Despite this reversal, a high prevalence of obesity among adolescent boys is still of concern. The Add Health study showed that 88% of adolescent boys remained obese as young adults (8).

The purpose of our study was to examine sex differences in overweight and obesity among inner-city adolescents in the Bronx, New York. Factors associated with excess weight may vary by sex, and treatment approaches may need to take into account these differences.

Methods

Study sample

This cross-sectional study took place during February through June and October through December of 2008. Inclusion criteria for this study included ability to speak and comprehend English and not being enrolled in special education classes. The Bronx has 350 public schools that enroll students in grades 7 through 10 (9). The 11



The opinions expressed by authors contributing to this journal do not necessarily reflect the opinions of the US Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the authors' affiliated institutions. Use of trade names is for identification only and does not imply endorsement by any of the groups named above.

participating schools served 11,789 students in grades kindergarten through 12, and 2,707 students were in grades 7 through 10. We enrolled 1,809 adolescents in grades 7 through 10 from 11 public schools in the Bronx; 1,619 (90%) students provided height and weight data.

Mean age of the participants was 13.9 years (standard deviation, 1.4; range, 11-18 y), and 51% were female. The sample was 75% Hispanic, 6% non-Hispanic African American, and 19% other race/ethnicity; 79% of participants were born in the United States. Data on maternal education indicated that 23% of mothers did not graduate from high school, 23% were high school graduates, and 54% had some college education or more. Thirty-seven percent of adolescents lived with both biological mother and father.

Procedures

The study was approved by the institutional review boards of the Albert Einstein College of Medicine and the New York City Department of Education. Before the start of data collection, letters that described the research study were mailed to parents. Parents were told to mail back a self-addressed, prepaid postcard or to notify a designated school official if they did not want their child to participate in the study. Before data collection, students had the choice to refuse participation or to sign an assent form if they agreed to participate. The participation rate was 68% (1,809 of 2,661). Reasons for nonparticipation were parental or student refusals (1% and 9%, respectively), letters to parents returned by the post office (2%), and absenteeism (20%).

Trained research staff measured students' height and weight by using a standardized procedure (10). Weight was taken on a Seca Robusta 813 digital scale (Seca GmbH & Co, Hamburg, Germany) while participants were wearing light clothing and no shoes. Standing height was measured with a Seca portable stadiometer 214 (Seca GmbH & Co, Hamburg, Germany) with a vertical backboard and a moveable headboard. These measures were obtained during physical education class, and privacy screens were used.

BMI and BMI percentiles were derived according to age- and sex-specific growth charts from the Centers for Disease Control and Prevention (11). Adolescents were classified as overweight (≥ 85 th and < 95 th percen-

tile), obese (≥ 95 th percentile), or severely obese (≥ 99 th percentile). Twelve adolescents were underweight (< 5 th percentile) and were excluded from the sample because the number was too low for meaningful comparisons. Because height and weight were not obtained on the day of consent, this information was missing for 190 students who were not present when research staff came back for these measures. Demographic characteristics were similar in the groups with and without height and weight data. Statistical analyses included calculation of percentage and mean differences between groups, which were tested using χ^2 and *t* tests, respectively. Analyses were conducted using Stata statistical software release 10 (StataCorp LP, College Station, Texas).

Results

Prevalence of overweight was 21.7%, and prevalence of obesity was 22.5%. These rates did not vary by age, grade, maternal education, or family structure. More Hispanic adolescents were obese than non-Hispanic adolescents (24% vs 17%, χ^2 test, $P = .003$). Among non-Hispanic African American adolescents, prevalence of overweight was 16%, and prevalence of obesity was 19%. The prevalence of obesity was higher among adolescents born in the United States than foreign-born adolescents (24% vs 17%, χ^2 test, $P = .008$), but rates of overweight were not statistically different (21% vs 24%, χ^2 test, $P = .21$).

Prevalence of overweight was higher among adolescent girls than boys, but prevalence of obesity and severe obesity was higher among adolescent boys than adolescent girls (Table). These sex differences were significant for Hispanic adolescents but not for non-Hispanic African American adolescents. Among obese adolescents, 37% of boys and 21% of girls had a BMI at the 99th percentile or higher.

Discussion

Findings from this inner-city and predominantly Latino sample of adolescents indicate that adolescent boys are at a higher risk of obesity than adolescent girls. Among the obese teenagers, a large proportion were found to be at a BMI percentile of 99th or higher — severely obese. Consistent with findings from a previous study, we found that US-born adolescents were more likely to be obese than foreign-born adolescents (12). Our results showed

that 44% of adolescents had a BMI at the 85th percentile or higher for their given age and sex. This prevalence of excess weight is larger than that reported for public school students in New York City (39%) (13) and the South Bronx (38%) (14) and higher than the national estimates for children aged 12 to 19 years (2). These studies also observed similar sex differences, but, for the most part, did not identify these differences as an emergent public health problem.

Data from the National Health and Nutrition Examination Survey showed that, except for non-Hispanic African American adolescents, boys are more obese than girls, although the sex difference is smaller than in our study (2). In New York City, data from kindergarten to eighth-grade students showed that adolescent boys are more likely to be obese than adolescent girls in all ethnic/racial groups except for non-Hispanic African Americans (13). National estimates of severe obesity in children also show sex differences; boys have a higher prevalence (15). However, this prevalence is lower than the prevalence we observed. Reasons for this larger difference remain to be examined. The Bronx is the poorest borough in New York City, and its residents are at higher risk of having poor health (16). A large proportion of adolescents do not meet the recommendations for fruit and vegetable consumption (80%) and exercise (43%) (14). These characteristics, together with a larger percentage of Latino residents (17), who are the most affected by the obesity epidemic, may help explain the large sex disparities in overweight and obesity observed in our study.

Our study has several limitations. The cross-sectional design prevented us from examining whether the sex differences in overweight and obesity persist or reverse as teenagers get older. The participating schools were not randomly selected, so the study sample may not be representative of the adolescent population in the Bronx. Furthermore, the large percentage of absentees (20%), although it is consistent with absentee rates for the area (18), limits the generalizability of the study findings.

Long-term prospective studies showed that obesity in youth continues into young adulthood (8,19), and persistent obesity is associated with increased risk of diabetes and hypertension in young adults (20). Therefore, although sex differences in obesity appear to be reversed in young adulthood (6,7) and in middle age (21), obesity among adolescent boys is of concern, given the health consequences of

excess weight in adulthood. Furthermore, little is known about the factors that put boys at a higher risk of obesity (4). This scarcity of research could contribute to a bigger public health problem for adolescent boys, especially among boys of Hispanic heritage. Whether preventive and treatment strategies should be tailored to adolescent boys, and how they should be tailored, needs immediate attention to ensure that boys become healthy adults.

Acknowledgments

We thank the principals and teachers of the schools for their support and the participating parents and students for their cooperation. We thank Ms Alma Idehen, health director of the Bronx Integrated Service Center, New York City Department of Health, and the Bronx School Nutrition and Fitness Committee for facilitating schools' participation. This work was supported by grant no. R21 HD052721 from the National Institute of Child Health and Human Development.

Author Information

Corresponding Author: Carmen R. Isasi, MD, PhD, Department of Epidemiology and Population Health, Albert Einstein College of Medicine of Yeshiva University, 1300 Morris Park Ave, Bronx, New York, 10461. Telephone: 718-430-2950. E-mail: carmen.isasi@einstein.yu.edu.

Author Affiliations: Amy Whiffen, Yolanda Florez, Katherine Freeman, Judith Wylie-Rosett, Albert Einstein College of Medicine of Yeshiva University, Bronx, New York; Eleanor Campbell, Lehman College, City University of New York, Bronx, New York.

References

1. Cook S, Weitzman M, Auinger P, Nguyen M, Dietz WH. Prevalence of a metabolic syndrome phenotype in adolescents: findings from the third National Health and Nutrition Examination Survey, 1988-1994. *Arch Pediatr Adolesc Med* 2003;157(8):821-7.
2. Ogden CL, Carroll MD, Flegal KM. High body mass index for age among US children and adolescents, 2003-2006. *JAMA* 2008;299(20):2401-5.
3. Miech RA, Kumanyika SK, Stettler N, Link BG,

- Phelan JC, Chang VW. Trends in the association of poverty with overweight among US adolescents, 1971-2004. *JAMA* 2006;295(20):2385-93.
4. BeLue R, Francis LA, Rollins B, Colaco B. One size does not fit all: identifying risk profiles for overweight in adolescent population subsets. *J Adolesc Health* 2009;45(5):517-24.
 5. Delva J, Johnston LD, O'Malley PM. The epidemiology of overweight and related lifestyle behaviors: racial/ethnic and socioeconomic status differences among American youth. *Am J Prev Med* 2007;33(4 Suppl): S178-86.
 6. Forrest KY, Leeds MJ. Prevalence and associated factors of overweight among Mexican-American adolescents. *J Am Diet Assoc* 2007;107(10):1797-800.
 7. Harris KM, Perreira KM, Lee D. Obesity in the transition to adulthood: predictions across race/ethnicity, immigrant generation, and sex. *Arch Pediatr Adolesc Med* 2009;163(11):1022-8.
 8. Gordon-Larsen P, The NS, Adair LS. Longitudinal trends in obesity in the United States from adolescence to the third decade of life. *Obesity (Silver Spring)* 2010;18(9):1801-4.
 9. New York City Department of Education. 2008-09 Class size report, 2008. <http://schools.nyc.gov/AboutUs/data/classsize/classsize12122008.htm>. Accessed March 10, 2010.
 10. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey (NHANES). Anthropometry procedures manual. http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf. Accessed March 10, 2010.
 11. Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z, et al. 2000 CDC growth charts for the United States: methods and development. *Vital Health Stat* 11 2002;(246):1-190.
 12. Ahn MK, Juon HS, Gittelsohn J. Association of race/ethnicity, socioeconomic status, acculturation, and environmental factors with risk of overweight among adolescents in California, 2003. *Prev Chronic Dis* 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0152.htm. Accessed March 10, 2010.
 13. Thorpe LE, Kerker B, Bartley KF, Egger JR, Konty KJ, Olson C, et al. Childhood obesity is a serious concern in New York City. Higher levels of fitness is associated with better academic performance. *Vital signs*. New York (NY): New York City Department of Health and Mental Hygiene; 2009.
 14. Matte T, Ellis JA, Bedell J, Selenic D, Young C, Deitcher D. Obesity in the South Bronx: a look across generations. New York (NY): New York City Department of Health and Mental Hygiene; 2007.
 15. Skelton JA, Cook SR, Auinger P, Klein JD, Barlow SE. Prevalence and trends of severe obesity among US children and adolescents. *Acad Pediatr* 2009;9(5):322-9.
 16. Karpati A, Kerker B, Mostashari F, Singh T, Hajat A, Thorpe L, et al. Health disparities in New York City. New York (NY): New York City Department of Health and Mental Hygiene; 2004.
 17. Demographic characteristics — New York City 1990 and 2000 census. <http://www.nyc.gov/html/dcp/pdf/census/demonyc.pdf>. Accessed March 18, 2010.
 18. Nauer K, White A, Yerneni R. Strengthening schools by strengthening families. Community strategies to reverse chronic absenteeism in the early grades and improve supports for children and families. New York (NY): Center for New York City Affairs, The New School; 2008.
 19. Deshmukh-Taskar P, Nicklas TA, Morales M, Yang SJ, Zakeri I, Berenson GS. Tracking of overweight status from childhood to young adulthood: the Bogalusa Heart Study. *Eur J Clin Nutr* 2006;60(1):48-57.
 20. Merten MJ. Weight status continuity and change from adolescence to young adulthood: examining disease and health risk conditions. *Obesity (Silver Spring)* 2010;18(7):1423-8.
 21. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA* 2006;295(13):1549-55.

The opinions expressed by authors contributing to this journal do not necessarily reflect the opinions of the US Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the authors' affiliated institutions. Use of trade names is for identification only and does not imply endorsement by any of the groups named above.

Table

Table. Prevalence of Overweight and Obesity, by Sex, Among Inner-City Adolescents, Bronx, New York, 2008

Body Mass Index Category (Percentile) ^a	Total, % (N = 1,607) ^b	Girls, % (N = 816)	Boys, % (N = 791)	P Value ^c
Overweight (≥85th to <95th)	21.7	24.5	18.8	.006
Obese (≥95th)	22.5	20.1	24.9	.02
Severely obese (≥99th)	5.1	3.6	6.7	.004

^a Body mass index percentiles were derived according to age- and sex-specific growth charts from the Centers for Disease Control and Prevention (11).

^b Of the 1,619 students who participated, 12 were classified as underweight and were excluded from analysis.

^c P values derived from χ^2 analysis.