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Trends in relative weight over one year in low-income urban youth

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Abstract

Objective—Recent cross-sectional data indicate the rates of childhood obesity are plateauing. Few large-scale longitudinal datasets exist, particularly in low-income and minority youth. The purpose of the current study was to describe longitudinal changes in relative weight among a large sample of low-income, minority youth over one year.

Methods—Participants were students from fifty-six schools in urban, low-income environments. There were 17,727 1st-6th graders (64% African American, 52% male) assessed at baseline and 13,305 youth (75.1%) were reassessed one-year later at follow-up. Measured height and weight were used to assess categorical (overweight, obesity, severe obesity) and continuous (BMI, percentile, z-score) measures of relative weight.

Results—Longitudinal data showed that over one year, BMI percentile (95% CI: −0.64 – −0.32,p<.001) and BMI z-score (95% CI: −0.02 – −0.01,p<.001) were significantly lower compared to baseline. The prevalence of overweight and obesity was stable over one year. Most (86.0%) youth remained in the same weight category as baseline, 6.8% improved weight category and 7.2% worsened weight category over one year.

Conclusions—These longitudinal data indicate that the relative weight of low-income, urban youth is showing signs of a small improvement over a one year follow-up period. The rates of childhood obesity, however, remain remarkably high and require continued, creative, public health efforts.

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Contributions. HGL, GM, SVV, LC, JWR, GDF participated in study conceptualization and design. SVV supervised data collection. TM coordinated and carried out data collection. TS designed data collection instruments and managed data entry. HGL conducted the analyses and drafted the initial manuscript. GDF reviewed and revised the manuscript. All authors reviewed and approved the final manuscript.

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Keywords

Childhood obesity; epidemiology

Introduction

Childhood obesity is a serious and prevalent public health problem, particularly in low-income youth. (1, 2) The data from the 2011-2012 National Health and Nutrition Examination Survey (NHANES) indicated the prevalence of childhood obesity was unchanged compared to 2003-2004 data. (3) Most recently, the Centers for Disease Control (CDC) reported that after decades of rising rates, obesity among low-income preschoolers declined slightly in 19 states and U.S. territories from 2008 through 2011 and had only increased in three. (4) Some communities have reported small decreases in the prevalence of childhood obesity in K-9 students. (5-7) All of these data, however, are based on repeated cross-sectional samples and, thus, are unable to examine the trajectories of individual youth.

Few large longitudinal datasets on childhood obesity exist and they are limited by self-reported anthropometric data, (8) cohorts that are now in adulthood, (9, 10) or ethnically homogenous samples. (11) Furthermore, longitudinal data were last collected from 2006-2009 (2, 11, 12), and few studies have examined longitudinal changes in severe obesity as recently redefined. (13) Recent studies that have investigated trends in severe obesity have relied on retrospective data from medical records, (14) repeated cross-sections, (15) or have included only middle school students. (16) Longitudinal research can help elucidate potential changes in obesity and severe obesity trends, which may be different from cross-sectional findings. This is particularly important for low-income and minority youth who may not be experiencing the same trends as their higher-income and non-minority peers. (6)

The purpose of the current study was to: 1) examine recent, longitudinal, one-year changes in categorical (overweight, obesity, severe obesity) and continuous (BMI, percentile, z-score) measures of relative weight in a large sample of low-income, minority youth and 2) assess how changes in relative weight vary by sex, race and grade.

Methods

Participants

Students in grades 1-6 were recruited from 56 K- 8 schools in Philadelphia. Schools were selected from the 25 highest-risk zip codes defined by the Philadelphia Department of Health based on poverty levels. The 56 schools had 94.6% (range 73.9 – 98.6%) of students eligible for free or reduced price lunch. Youth were enrolled using passive consent (consent forms were sent home with students and were returned only if parents did not want their child to participate). At baseline and follow-up, 93.6% and 81.4% of eligible students were enrolled, respectively (Figure 1). Biologically implausible changes were defined as: 1) weight change greater than 22.7kg/50 lbs (or 27.2kg/60 lbs if the individual was severely obese at baseline) (n=8); 2) any height decrease (n=2); or 3) height increase greater than 15

cm (n=16). Since it could not be determined whether a biologically implausible longitudinal change was due to error at baseline versus follow-up, these youth were removed from both time points. Underweight students (i.e., BMI percentile <5) were excluded from inferential analyses (319 at baseline, 353 at follow-up) due to their small number but were retained for descriptive prevalence data. One of the 56 schools at baseline converted to a charter school and chose not to participate at follow-up. Longitudinal data were obtained for 75.1% of the baseline sample with the majority of attrition due to youth transferring to schools that were not participating in the study. The transfer rate in the current study is similar to other studies with urban diverse samples. (2) Thus, the final sample for the current study included 13,305 students with longitudinal data available (1^{st}-6^{th} grade at baseline; 2^{nd}-7^{th} grade at follow-up). The primary analyses for this study were conducted on this longitudinal sample. In addition, secondary analyses were conducted on the two cross-sectional samples (17,727 students in 1^{st}-6^{th} grade at baseline, 16,046 in 1^{st}-6^{th} grade at 1 year).

Measures

Height and Weight—Trained research assistants used standard protocols to measure height and weight with portable stadiometers (Perspective Enterprises PE-AIM-101) and scales (SECA Alpha 882 and SECA Large Capacity 634), respectively. Youth were instructed to remove shoes, any extra layers of clothing, and all items from pockets for measures. Height and weight were measured by taking 2 measurements required to be within 1 cm and 0.2 kg, respectively, or a third measure was taken and the two within the specified range were averaged. As this was a US sample, the CDC cutoffs (13, 17) were used to define weight status category based on BMI percentile as has been done in other US samples. (3, 7) The categories were: underweight (<5^{th} percentile); healthy (≥5^{th} and <85^{th} percentile); overweight (≥85^{th} and < 95^{th} percentile); obese (≥ 100% to < 120% of the 95^{th} percentile), and severely obese (≥120% of the 95^{th} percentile). Thus, BMI percentile included the full spectrum of percentages from 0 to over 100 (to characterize severe obesity as a percentage of the 95^{th} percentile). BMI z-score was calculated using the CDC age- and sex-adjusted norms. (17)

Demographics—Race, sex, month and year of birth, and grade level were obtained from schools. Race, as categorized by the school district based on parent self-report, was African American, Hispanic, Caucasian, Asian, and Other. The study was approved by the Office of Research Evaluation at the School District of Philadelphia as well as the Institutional Review Boards at Temple University and the Philadelphia Department of Health. Baseline data were collected from February 2011 to June 2011 and at follow-up from December 2011 to May 2012 (difference of 281 ± 30 days).

Data Analysis

Longitudinal Analyses—Categorical variables were examined using an ordinal regression mixed model (relative weight at baseline and follow-up nested within individual) and logit link function with a dummy coded time (i.e., change) variable as the predictor. This estimated the change in youths' odds of being in the given relative weight category. Continuous variables were examined using linear mixed models (with a random intercept for individual).

Race, age and sex effects—Associations of demographic characteristics (sex, race, grade) to weight status were tested with multinomial logistic regressions at baseline in the longitudinal sample. In the longitudinal models, interaction terms were added for sex, race, and grade with time. Nested models were compared using the −2 log likelihood method for model comparisons such that an unconditional model was compared to a main effects model and then to a third model with the interaction term added. Models were run separately for sex, race, and grade. In addition, multivariate models controlling for sex, race, and grade were run and showed similar patterns (data not shown). Demographic characteristics were dummy coded (reference=females, African Americans, and first graders).

Secondary Cross-sectional Analyses—. Although it was known that the majority of the sample contained repeated measures on the same children, the study sought to replicate standard procedures for analyzing school surveillance data in which repeated measures occur but are not known. Therefore, secondary analyses were conducted with the full cross-sectional samples to aid in comparisons across studies. To examine relative weight over time in the two cross-sectional samples (i.e., treating samples as independent cross-sections), chi-square tests were run for categorical variables and t-tests were run for continuous variables.

All analyses were conducted in the statistical package R (version 3.0.2). The p-value was set at .01 for all analyses due to the large sample size and multiple tests. The low intraclass correlations for relative weight outcomes (BMI percentile, BMI-z, BMI) clustering by school (ICC range=.005 - .009) supported the use of individual-level analyses.

Results

Participant characteristics are shown in Table 1. The sample was predominantly African American (63.6%) and was equally distributed by sex and grade. At baseline in the longitudinal sample, Hispanic youth had significantly higher odds of being overweight and obese (28 and 49% higher, respectively), and Asian youth had significantly lower odds of being severely obese (56% lower) compared to African Americans ($p<.01$ for all; see Table 2). Fourth, fifth, and sixth graders had significantly higher odds (27% - 59%, $p<.01$) of being in higher relative weight categories compared to first graders.

Longitudinal Results

There were no significant changes in the prevalence of the relative weight categories from baseline to one year (Table 3). There were, however, small but statistically significant decreases in BMI percentile, BMI-z, and an increase in unadjusted BMI after 1 year (Table 3). Changes in weight category from baseline to follow-up are shown in Figure 2. Among youth classified as obese at baseline, 16.0% moved into the overweight or healthy weight category at follow-up, while 8.0% moved into the severely obese category, and 76.0% remained in the obese category. Among those who were severely obese, 84.1% remained in the severely obese category, and 15.9% moved to an improved category. Of youth in the healthy weight category at baseline, 6.2% moved to a worse weight category. Overall, 7.2% of youth moved to a worse weight category, 6.8% moved to an improved weight category, and 86% remained in the same weight category.

The only significant main effect or interaction for sex, race, or grade for categorical outcomes was that Asians were significantly less likely to move to the overweight and obesity combined category (BMI ≥85th percentile) over one year compared to African Americans (11%-19% less likely, p<.001). For continuous outcomes, there were significantly greater reductions in BMI percentile and BMI-z in boys than in girls (interaction p<.01, eTable 1 and eFigure 1) and in Asians than in African Americans (interaction p<.01, eTable 2 and eFigure 2). In addition, first graders showed significantly greater decreases in BMI percentile and BMI-z over time (p<.01, eTable 3) than all other grades.

Secondary Cross-sectional Results

Cross-sectional sample characteristics are shown in eTable 4. There were no significant differences between the longitudinal and cross-sectional samples on any measure at baseline or at follow-up. There were no significant changes in categorical or continuous measures of relative weight from baseline to follow-up in the cross-sectional samples (Table 3). The differences by sex, race, and grade were similar across the longitudinal and cross-sectional samples (data not shown).

Discussion

The current study examined recent, longitudinal trends in relative weight in a large, low-income, minority sample of urban US youth. There were several principal findings.

First, the longitudinal results showed small but statistically significant decreases in BMI percentile and BMI z-score after 1-year. There were, however, no significant changes in the prevalence of overweight, obesity or severe obesity. There was a trivial but statistically significant increase in unadjusted BMI. This is expected due to natural increases in BMI as youth age.

Longitudinal data from 2006-2009 in low-income, ethnic minority 6th graders followed for 2.5 years from the HEALTHY study showed a 4.1 percentage point decrease in the combined prevalence of overweight and obesity and a 0.01 decrease in BMI-z in the control group (n = 2,296) receiving no intervention. (2) The reason for HEALTHY's greater reduction in prevalence is unknown. Although both samples were low-income minorities, the current sample was larger (13,305 versus 2,296), younger (9.8 versus 11.3 years), had a lower obesity prevalence (22.4% versus 30.3%), a lower proportion of Hispanics (17.7% versus 54.2%) and a slightly shorter follow-up period (1 versus 2.5 years) than the HEALTHY untreated cohort. Despite these differences, both HEALTHY and the current sample experienced similar reductions in BMI z-score.

It is encouraging that a significant number of participants in the overweight (18.4%), obese (16.0%) and severely obese (15.9%) categories shifted to a lower relative weight category. Downward shifts in relative weight category have been associated with improvements in cardiometabolic outcomes. (18) By contrast, 13.7% of overweight youth and 8.0% of obese youth shifted to a higher relative weight category. However, among overweight, obese, and severely obese youth, the percent of youth who improved in their weight status category

consistently outnumbered the percent of youth who moved to a worsened weight status category (13.7% of overweight and 8% of obese worsened while 18.4% and 16.0% improved, respectively). The incidence of obesity in healthy or overweight youth in the current study (14.1%) was also slightly lower than that of other school surveillance data (average 15.8% across age groups) collected in 2002-2003 from a large, diverse sample of similar-aged youth. (12) Compared to the current study, a smaller longitudinal study (n=1,349) of 4^{th}-6^{th} graders in Philadelphia from 2002-2005 found a higher incidence of overweight (14.9% vs 5.8%) but a lower incidence of obesity (6.4% vs 13.7%) among untreated controls (n=600). (19) These discrepancies may be related to the differences in sample size, age, or follow-up period (1 vs 2.5 years).

While the reasons for the stability and/or slight improvement in relative weight in this large longitudinal sample are unknown, several community changes occurred during the study period. A Communities Putting Prevention to Work grant from the CDC to the City of Philadelphia was used to establish a multi-component initiative, Get Healthy Philly (GHP), aimed at reducing obesity. GHP began in March 2010 and made several changes including, promoting healthier products in corners stores, adding farmers' markets in low-income neighborhoods, creating food and fitness standards for afterschool programs, increasing physical activity in schools, removing junk foods from classrooms, and educating caregivers via media campaigns about the health harms of sugary drinks. (20) However, due to the lack of control group, the multiple, low-intensity, broad-spectrum changes, and the relatively short exposure (< 1 year since baseline), it is difficult to attribute the current study's findings to GHP. It was unclear whether these changes reflect a regression to the mean or an actual reduction in relative weight in the population.

Demographic Differences

The second principal finding was that females and Hispanics showed a higher prevalence of obesity and Asians showed a lower prevalence of overweight, obesity, and severe obesity compared to males and African Americans. However, the only significant differences in change over time was that boys had greater decreases in BMI-z and BMI percentile than did girls, and African American and Asian youth showed significant decreases over time. These data are similar to consistent findings that Hispanic youth have the highest prevalence of obesity. (3, 6, 12) While some studies have also shown that girls have higher prevalence of obesity, (3) others have not (6, 12). These data expand on previous studies (4-7) by showing that individual trajectories of school-age, minority youth may also be showing small signs of improvement in relative weight over time. While the effects are small and the time frame is short, these data support that special attention is needed to address childhood obesity in girls and Hispanic youth.

In addition, the current study found differences in relative weight by age such that youth in first grade significantly improved over one year and youth in 4^{th}-6^{th} grades compared to first graders were more likely to be in higher relative weight categories at baseline. These findings are similar to other studies that have shown increased prevalence of obesity with age/grade. (3, 5) The fact that older children were more likely to be obese and younger

children showed improvements over the year suggests that interventions earlier in the life course are needed.

Severe Pediatric Obesity

The third principal finding described trends in those considered severely obese based on the new recommended cutoff of ≥ 120% of the 95th percentile (13) rather than the 99th percentile. (21, 22) Few studies have used the new criteria or longitudinal data to examine severe obesity in children. The current study found a higher prevalence of severe obesity (8.6%) than recent national prevalence data (5.9%) (15) and state surveillance data (6.4%) (23) in diverse youth using the 120% of the 95th percentile definition. The current data showed that those in the severe obesity category were remarkably stable (84.1%) compared to youth in the overweight (67.9%) or obese (76.0%) categories. Previous research with diverse youth has shown that approximately 72-74% of severely obese youth remained severely obese roughly 2 years later.(14, 16) Other research has shown that 70% of severely obese youth remain severely obese in adulthood. (24) Moreover, it is troublesome that 8.4% of youth became severely obese over a period of just one year, which is consistent with national data showing an increased prevalence of severe obesity. (15) While 8.4% of students became severely obese, it is encouraging that 15.9% of youth who were severely obese at baseline were no longer severely obese at follow-up. Although there were no statistically significant differences across race in severe obesity, the pattern of results in the current study (Caucasians had the highest prevalence) was contrary to the patterns seen in other studies (Caucasians had the lowest prevalence). (23-25) The reasons for the difference are unknown; however, previous samples were national samples (24, 25) or did not specifically target low-income neighborhoods. (23) Special attention to severe pediatric obesity is warranted, particularly in low-income and minority youth who are more likely to be severely obese than their non-minority peers. (24, 25)

Cross-Sectional Findings

Lastly, the secondary cross-sectional analyses revealed no significant changes in categorical or continuous relative weight measures between 2011 and 2012. These data are consistent with national cross-sectional prevalence data that showed a leveling off of childhood obesity from 2010 to 2012. (3) Some state level cross-sectional data have suggested a decrease in childhood obesity overall (5) or within some demographic groups. (6) Previous cross-sectional data in Philadelphia from 2006-2010 showed a small significant decrease in obesity prevalence (1 percentage point decrease), but the decreases from 2008-2010 were similar to the current data (0.1 percentage point decrease). (7) The stabilization or small decrease in childhood overweight and obesity in this and other cross-sectional studies is encouraging compared to the tripling of childhood obesity seen over the last 30 years. (1) However, the overall prevalence rate (22%) remains remarkably high, which has significant implications for the nation's medical, (26) psychosocial, (27) and economic (28) health. These same demographic trends in main effects were also generally significant across the secondary cross-sectional analyses.

The study has a number of strengths including a large sample of minority youth, carefully measured heights and weights, repeated measures, and high participation rates. The

longitudinal nature of the current study allows for inferences to be made at the individual level (i.e., data on how individuals fare over the course of a year) rather than describing group level prevalence trends as is done in repeated cross-sections. This results in greater power to detect changing trends as demonstrated in the current study by significant reductions in relative weight in the longitudinal sample but not the cross-sectional samples. The study also had limitations including a relatively short follow-up period and the treatment of the cross-sectional data as independent samples, despite the known high degree of overlap. However, similar methodologies are used in school surveillance studies though the degree of overlap is unknown. (5, 6, 12). Finally, pubertal status was not measured in the current study but a large trial including diverse youth in pubertal transition showed no relation with pubertal status to shifts in BMI. (18)

Conclusion

In conclusion, few large longitudinal datasets exist, especially in minority youth and using objective anthropometric measures. This study is the largest prospective longitudinal dataset of carefully measured relative weight in children since 2004 and suggests slight but statistically significant improvements in childhood obesity among low-income and minority youth on some relative weight measures (BMI z-score and percentile). Hispanic youth showed the highest rates of obesity, and girls were not showing the same improvements in relative weight over the year as boys exhibited, suggesting that Hispanic youth and girls are in special need of effective prevention and/or intervention efforts. Overall, these data suggest that childhood obesity rates are moving in the right direction, especially among boys, Asians, and younger children. However, it remains troublesome that so many youth are overweight or obese and particularly concerning that low-income and minority youth exhibit such high and stable rates of severe obesity. Despite some initial positive signs, childhood obesity requires continued, creative, public health efforts.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What is Known

- Cross-sectional studies in recent years have shown possible declines in childhood obesity

What this Study Adds

- Longitudinal data from low-income, minority youth are showing signs of a small improvement in relative weight, especially among boys, Asians and younger children over a one-year follow-up period.
- Severe obesity prevalence among low-income minority youth was 8.6% and of special concern.
- Not all subgroups, including girls, Hispanics, and older youth, showed signs of improvement.

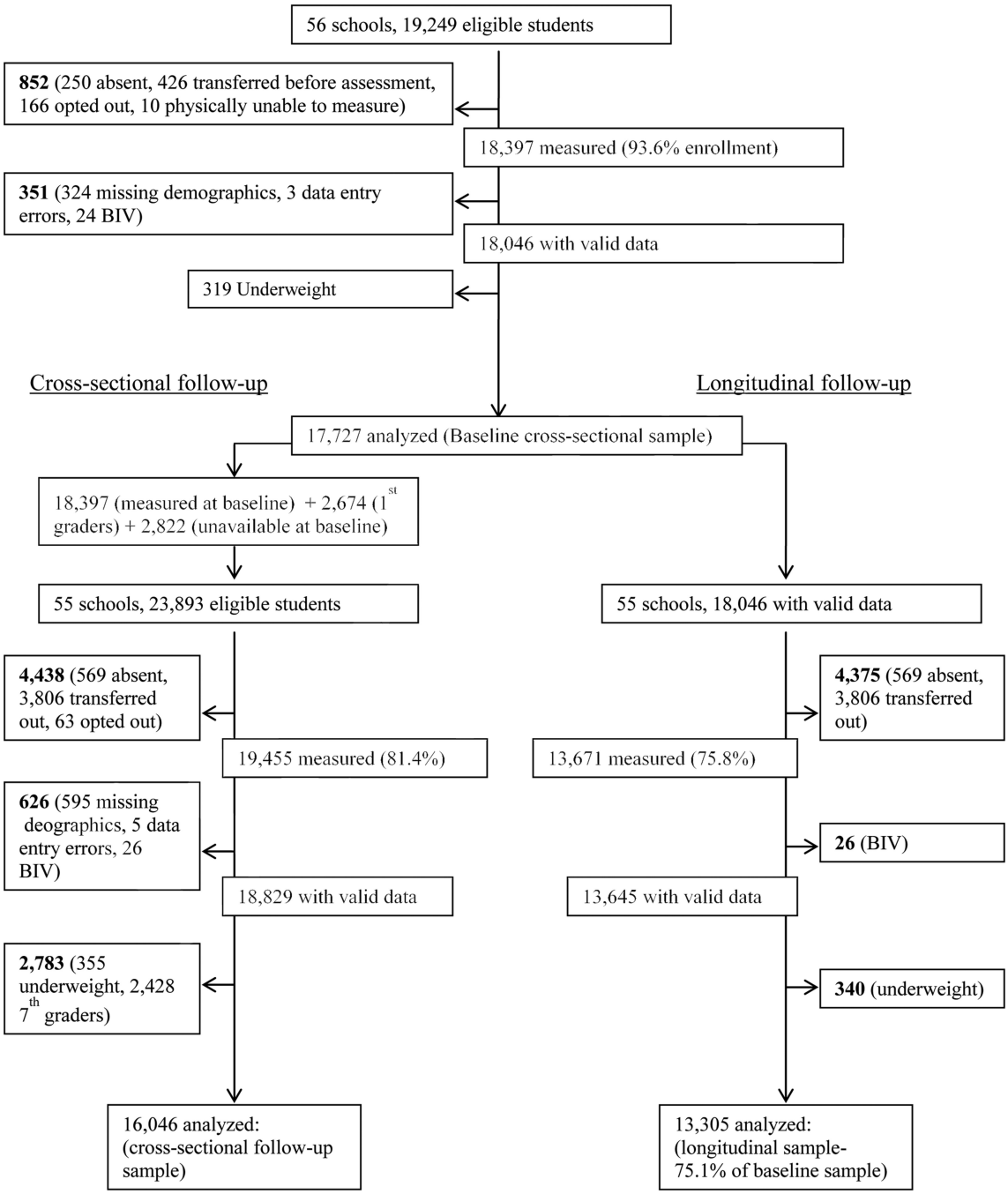

Figure 1.
CONSORT diagram

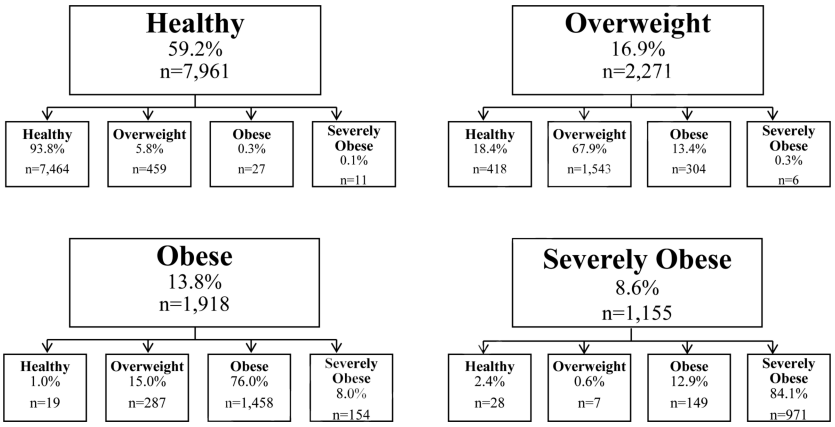

Figure 2.

Weight status category change over 1 year in longitudinal sample (n=13,305)

Table 1

Participant characteristics in the longitudinal sample (n=13,305).

Characteristic	Baseline
Sex	No. (%)
Males	6890 (51.8)
Females	6415 (48.2)
Race	
African American	8465 (63.6)
Hispanic/Latino	2351 (17.7)
White	961 (7.2)
Asian	1017 (7.6)
Other	511 (3.8)
Grade	
First	2411 (0.18)
Second	2369 (0.18)
Third	2163 (0.16)
Fourth	2215 (0.17)
Fifth	2019 (0.15)
Sixth	2089 (0.16)
	Mean (SD)
Age (yrs)	9.73 (1.81)
BMI Percentile	69.70 (26.80)
BMI-z	0.76 (1.02)
BMI	19.90 (4.85)

Note: Grade demographic sums may not equal total sample size due to some missing information. The longitudinal sample is a subset of both cross-sections that had measures available at both time points. Underweight participants (<5th percentile) were excluded from analyses.

Table 2

Relative weight category prevalence and demographic differences in odds of being overweight, obese and severely obese compared to healthy weight at baseline (n=13,305)

Characteristic	Un[a]	He	Ov	Ob	SO	Healthy	Overweight	Obese	Severely Obese
	Prev	Prev	Prev	Prev	Prev	OR (CI)	OR (CI)	OR (CI)	OR (CI)
Whole Sample	1.6	59.2	16.9	13.8	8.6	--	--	--	--
Sex							−2LogL=11.2(3),p=.01		
Females	1.7	57.9	17.5	14.3	8.6	Ref	Ref	Ref	Ref
Males	1.6	60.3	16.3	13.4	8.5	1	0.89 (0.81 - 0.98)	**0.88 (0.79 - 0.97)**	0.97 (0.86 - 1.10)
Race							−2LogL=115(12),p<.01		
African American	1.6	60.2	16.5	13.0	8.8	Ref	Ref	Ref	Ref
Hispanic/Latino	1.1	53.6	18.3	17.4	9.5	1	**1.28 (1.13 - 1.44)**	**1.49 (1.31 - 1.69)**	1.22 (1.04 - 1.43)
White	1.5	57.7	16.9	14.3	9.6	1	1.05 (0.87 - 1.26)	1.16 (0.95 - 1.40)	1.03 (0.81 - 1.30)
Asian	3.0	65.6	15.5	11.7	4.2	1	0.85 (0.71 - 1.02)	0.80 (0.65 - 0.98)	**0.44 (0.32 - 0.60)**
Other	2.6	57.3	18.6	14.9	6.6	1	1.06 (0.83 - 1.35)	1.20 (0.94 - 1.55)	0.78 (0.54 - 1.11)
Grade							−2LogL=230(15),p<.01		
First	1.8	63.3	15.7	12.0	7.1	Ref	Ref	Ref	Ref
Second	1.7	62.2	15.8	12.9	7.4	1	1.04 (0.89 - 1.22)	1.14 (0.96 - 1.36)	1.14 (0.91 - 1.41)
Third	1.3	60.7	15.8	14.0	8.1	1	1.00 (0.85 - 1.18)	1.24 (1.04 - 1.47)	1.14 (0.91 - 1.42)
Fourth	1.7	57.2	17.0	15.0	9.1	1	1.16 (0.99 - 1.36)	**1.46 (1.23 - 1.73)**	**1.41 (1.14 - 1.75)**
Fifth	1.8	55.4	18.5	14.1	10.3	1	**1.33 (1.13 - 1.56)**	**1.35 (1.13 - 1.61)**	**1.59 (1.28 - 1.98)**
Sixth	1.5	55.4	18.6	14.9	9.6	1	**1.27 (1.08 - 1.49)**	**1.45 (1.22 - 1.73)**	**1.46 (1.18 - 1.82)**

Notes: bold values indicate p< .01, Each group's odds of being in the healthy weight, overweight, obese, or severely obese category were compared to the odds of the reference group being in the respective relative weight category.

Abbreviations: B=baseline, 1YR=1 year follow-up, Prev=Prevalence, OR=Odds Ratio, CI=95% confident interval, Un=underweight (<5th percentile), He=Healthy (5th to <85th percentile), Ov=overweight (85th to <95th), Ob=obese (100% to < 120% of 95th percentile), SO= severely obese (≥120% of 95th percentile), Ref=reference group.

[a]Underweight youth were included descriptively and were removed from inferential analyses due to small cell size.

Table 3

Cross-sectional and longitudinal results of change in relative weight after one-year

Longitudinal Results				
Categorical	**Baseline %**	**Follow-up %**	**OR (95% CI)**	**P value**
Overweight	17.07	17.26	1.09 (0.91 - 1.29)	0.35
Obesity	14.42	14.57	1.03 (0.85 - 1.24)	0.76
Overweight & obese	31.49	31.83	1.10 (0.94 - 1.28)	0.23
Severe obesity	8.68	8.58	0.87 (0.65 - 1.16)	0.34

Continuous	**Baseline mean (SD)**	**Follow-up mean (SD)**	**Delta (95% CI)**	**P value**
BMI percentile	69.70 (26.8)	69.20 (27.3)	−0.48 (−0.64 - −0.32)	<.001
BMI-z	0.76 (1.02)	0.74 (1.02)	−0.02 (−0.02 - −0.01)	<.001
Unadjusted BMI	19.90 (4.85)	20.43 (5.02)	0.53 (0.51 - 0.55)	<.001

Cross-sectional Results				
Categorical	**Baseline %**	**Follow-up %**	**Delta**	**Significance Test**
Overweight	17.13	17.07	−0.05%	χ^2 (1)= 0.03, p=.87
Obese	14.04	14.07	0.03%	χ^2 (1)= 0.01, p=.92
Overweight & obese	31.17	31.14	−0.03%	χ^2 (1)= 0.01, p=.95
Severe Obesity	8.69	8.11	−0.59%	χ^2 (1)= 3.95, p=.05

Continuous	**Mean (SD)**	**Mean (SD)**	**Delta (95% CI)**	**Significance Test**
BMI percentile	74.20 (34.40)	73.30 (34.10)	−0.9 (−0.20 - −1.61)	t(36,202)=2.06, p=.04
BMI-z	0.74 (1.03)	0.71 (1.03)	−0.03 (−0.003 - −0.05)	t(36,202)=2.26, p=.02
Unadjusted BMI	19.90 (4.92)	20.00 (4.69)	0.1 (−0.20 - 0.005)	t(36,202)=1.85,p=.06

Note: p value set at .01 for all analyses.