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Socioeconomic differences in overweight and weight-related behaviors across adolescence and young adulthood: 10-year longitudinal findings from Project EAT

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Abstract

Reducing socioeconomic disparities in weight-related health is a public health priority. The purpose of this paper was to examine 10-year longitudinal patterns in overweight and weight-related behaviors from adolescence to young adulthood as a function of family-level socioeconomic status (SES) and educational attainment. Project EAT (Eating and Activity in Teens and Young Adults) followed a diverse sample of 2,287 adolescents from 1999 to 2009. Mixed-effects regression tested longitudinal trends in overweight, fast food, breakfast skipping, physical inactivity, and screen use by family-level SES. The influence of subsequent educational attainment in young adulthood was examined. Results revealed that the prevalence of overweight increased significantly from adolescence to young adulthood with the greatest change seen in those from low SES (mean change = 30.7%, 95% CI = 25.6%-35.9%) as compared to high SES families (mean change = 21.7%, 95% CI = 18.2% to 25.1%). Behavioral changes from adolescence to young adulthood also differed by SES background; the prevalence of frequent fast food intake (3 times/wk) increased most dramatically in those from low SES (mean change = 6%, 95% CI = 0.5%-11%) as compared to high SES families (mean change = -1.2%, 95% CI = -5.2%-2.9%). Overall trends suggest that a higher educational attainment mitigates the negative impacts of a low SES background. These findings suggest that continued effort is needed to ensure that public health strategies addressing obesity and related behaviors reach adolescents and young adults from low SES backgrounds and do not contribute to widening socioeconomic gaps in weight-related health.

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Introduction

Socioeconomic inequalities in a wide range of health risk behaviors have been documented.¹ Increasing rates of child and adolescent overweight and obesity have disproportionately affected those in the lowest socioeconomic status (SES).² For example, in the United States, 12% of children and adolescents (aged 2-19 years) from the highest income groups are categorized as obese according to current guidelines, whereas obesity impacts 21% of boys and 19% of girls from the lowest income groups; similar disparities are observed when obesity prevalence is examined by parental educational attainment.² Parent education also predicts obesity risk in young adulthood.³ While the dramatic increases in the prevalence of obesity over the past several decades appear to be leveling off, obesity rates continue to increase among lower SES young people.⁴

Socioeconomic inequalities in obesity prevalence may be explained by differences in obesity-promoting behaviors, including poor dietary habits and sedentary behaviors.⁵ For example, studies have shown that youth from low SES families are more likely to report high fast food intake,^{6,7} breakfast skipping,⁸ and excess screen time⁹ and less physical activity¹⁰ than their peers of higher SES. The reason for these differences in weight-related behaviors is not clear, but economic and educational disadvantage may shape an individual's ability to engage in particular health-promoting behaviors.¹¹ For example, the low cost of fast food meals as compared to fresh fruits, vegetables and lean meats, combined with the high prevalence of fast food restaurants and low prevalence of recreational resources in low SES neighborhoods might have a differential impact on the diet quality of youth from low SES families.^{10,12} These conditions may be further exacerbated by stress, social norms and low social support leading to less favorable weight-related behaviors among low SES adolescents.¹³

Few studies have the data to examine longitudinal changes in adolescent weight gain and weight-related behaviors as a function of SES. One exception is Project EAT, a longitudinal study of weight-related health in young people. Changes in overweight status over five years, from early to late adolescence, across SES background were previously examined in the Project EAT cohort.¹⁴ Findings suggested that low SES boys were more likely to remain overweight from early to late adolescence, and low SES girls were more likely to become overweight by late adolescence. Data from the Longitudinal Study of Adolescent Health (Add Health) also suggests that parent education level is associated with a greater risk for obesity in adolescence and in young adulthood,³ and that socioeconomic disadvantage in adolescence is associated with a steeper weight gain trajectory over time.¹⁵

Despite this important previous work, SES disparities in weight change as adolescents transition to young adulthood remain inadequately explored, and little research has simultaneously examined weight-related behaviors and weight status as a function of SES. Understanding how SES disparities evolve over this critical developmental window is important given that rates of overweight rise dramatically during the transition into young adulthood,¹⁶ and SES in childhood has been linked to adult obesity.¹⁷ Further, little is known about how individual educational attainment in young adulthood might mitigate the influence of experience low SES during adolescence. A better understanding of these

disparities across the transition from adolescence to young adulthood is needed to inform the development of interventions aimed at improving behaviors such as fast food consumption, breakfast skipping, physical inactivity and screen use, and addressing obesity in high risk groups.

The present study builds on previous findings by examining 10-year longitudinal patterns in weight status change by family-level SES during the critical developmental period that ties adolescence to adulthood. It also extends previous findings by examining trends in behaviors of potential relevance to weight gain across SES backgrounds. Finally, an additional aim of this study was to determine if educational attainment changes the way that SES background is associated with weight-related outcomes. It was hypothesized that longitudinal changes in weight and weight-related behaviors will be less favorable in youths from low SES families and that those youths who achieve a higher educational attainment in young adulthood will experience more favorable outcomes.

Methods

Participants and Procedures

Classroom surveys were completed by Project EAT participants who were middle/high school students attending one of 31 public schools in the Minneapolis/St. Paul metropolitan area in 1998-1999 (EAT-I). At 10-year follow-up (EAT-III: 2008-2009), participants completed an online or mailed survey. Informed consent was obtained from all study participants and protocols were approved by the University of Minnesota's Institutional Review Board.

Of the original school-based sample, 27.5% were lost to follow-up. Of the remaining 3,442 participants, 2,287 young adults completed follow-up surveys in 2008-2009 (66% of participants who could be contacted). As compared to the baseline sample, those who completed 10-year follow-up surveys were more likely to be female, white, of higher SES, and exhibit healthier lifestyle behaviors and weight status; therefore, the sample was weighted to adjust for sociodemographic differences using the response propensity method (calculated from the inverse of the estimated probability that an individual responded to the EAT-III survey).¹⁸ After weighting, the lifestyle behaviors and weight status of those lost to follow up were very similar to the original sample.

Characteristics of the weighted analytic sample are presented in Table 1 (n=2,203), which was restricted to individuals with complete information on their SES at baseline. The mean age of participants was 14.9 years (SD=1.6) at baseline and 25.3 years (SD=1.6) at follow-up and participants were fairly evenly distributed across SES categories.

Measures

Survey measures were piloted with focus groups and test-retest reliability was assessed over a two week period at baseline (n=161) and at 10-year follow-up (n=66). Additional details about the survey instrument's development are described elsewhere.¹⁹

SES—Family-level SES was assessed with a 5-level variable derived from parents' education, defined as the highest level of education of either parent and obtained from adolescents at baseline, and has previously predicted weight change patterns.¹⁴ In cases where parents' education was missing, other related variables including family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parent employment status were used to impute the value. In addition, in cases where reported parental education was implausible based on other SES indicators, it was corrected based on an algorithm described previously.¹⁴ In 4% of adolescents, no data were available on which to assign SES. The 5-level variable was collapsed into three categories: low, middle, and high SES. **Educational Attainment** was assessed at follow-up by asking participants about their highest level of education completed.²⁰ Response options included: a) middle school or junior school; b) some high school; c) high school graduate or GED; d) vocational, technical, trade or other certification program; e) associate degree; f) bachelor degree; g) graduate or professional degree; and h) other. Responses were collapsed into 3 groups: high school graduate or lower, vocational/associate degree, and bachelor degree or higher.

Weight Status—Overweight status based on self-reported height and weight was classified according to the cut-points of a body mass index (BMI) (kg/m^2) 85th percentile at baseline (based on CDC growth charts for children and adolescents)²¹ and 25 kg/m^2 at follow-up.²² Self-reports were highly correlated with measured height and weight data collected from adolescents at baseline ($r=0.88$ males; $r=0.85$ females) and a subsample of young adults at follow-up ($r=0.95$ males; $r=0.98$ females). Weight status for young adults who reported being pregnant at the time of data collection ($n=89$) was treated as missing.

Weight-related Behaviors—Fast food intake was self-reported for the past week (range: 0-7+ times per week) (test-retest $r=0.48$). Responses were dichotomized at 3 times/week based on increased health risk.²³ **Breakfast skipping** was assessed using the item: "In the past week, on how many days did you eat breakfast?" (test-retest $r=0.82$). Breakfast skippers were defined as those who skipped breakfast on five or more days per week based on previous studies showing an increased risk for obesity.⁸ **Physical inactivity** was measured with the Leisure Time Exercise Questionnaire.²⁴ Two survey items individually assessed hours per week spent in strenuous intensity (e.g., biking fast, aerobics, jogging) and moderate intensity exercise (e.g., walking quickly, easy bicycling, volleyball, skiing) (test-retest $r=0.68-0.83$). Mean hours per week engaged in moderate-to-vigorous physical activity (MVPA) were compared against age-specific physical activity guidelines^{25,26}: adolescents achieving < 7 hours per week of MVPA and young adults achieving < 2.5 hours per week of MVPA were considered inactive. **Screen time** was assessed using items adapted from Planet Health²⁷ that asked participants to report the number of hours per week day and weekend day they spent watching TV and videos (test-retest $r=0.74-0.79$). Responses were dichotomized at > 2 hours per day based on Healthy People 2020 recommendations.²⁵

Sociodemographic Characteristics—Participants' self-reported their age, sex, and race/ethnicity (White, Black, Hispanic, Asian, or other).

Statistical Analysis

Frequencies and prevalence of participant characteristics and of overweight and weight-related behaviors at baseline and follow-up were examined across low, middle and high family-level SES. Differences across SES categories were examined using the likelihood ratio test.

Longitudinal changes (EAT-I to EAT-III) in the proportion of individuals who were classified as overweight, frequently consumed fast food, skipped breakfast, failed to meet MVPA guidelines, and had high screen use were examined across family-level SES categories using mixed-effects logistic regression that included a main effect for SES (low, middle, or high), a main effect for time (EAT-I or EAT-III), an individual random-effect, and a time by SES interaction. Separate regression models were run with complete cases for each outcome. Results are presented as the mean change in predicted prevalence and 95% confidence intervals, testing for SES by time interactions on the additive scale, indicators that the trajectory of outcomes over time differs by family-level SES.

We also examined whether young adult educational attainment deviations from family-level SES (proxy for change in SES from adolescence to young adulthood) were associated with weight outcomes in young adulthood. Since family-level SES was based on parent education, these two measures of SES are closely aligned. Young adults were categorized into nine groups representing all possible combinations of family-level SES assessed at baseline (low, middle, or high) and educational attainment assessed at follow-up (high school, associate/vocational degree, bachelor degree). Each weight-related outcome was then regressed on indicators for these nine adolescent-adult SES combinations using logistic regression. Results are presented as the adjusted mean prevalence of overweight and weight-related behaviors in young adulthood for each SES change category. All regression analyses were adjusted for age, sex and ethnicity. A p-value ≤ 0.05 was considered statistically significant. All statistical analyses were conducted in STATA v.13.

To examine the potential bias of self-reported BMI, sensitivity analyses were conducted using data from a subsample of adolescents with measured BMI at baseline (n=1,894) and applying BMI correction equations at follow-up.²⁸ Results from these analyses were similar; therefore, findings presented are based on self-reported BMI.

Results

The overall prevalence of overweight and selected weight-related behaviors reported in adolescence and at follow-up is presented in Table 1.

Cross-Sectional Prevalence of Weight-Related Outcomes by Family-Level SES

Family-level SES was associated with weight-related outcomes in both adolescence (EAT I) and young adulthood (EAT III) (Table 1). In adolescence, the prevalence of overweight, breakfast skipping, and physical inactivity were significantly higher in adolescents from a low SES background than among those from a high SES background. In young adulthood, disparities in a greater number of behaviors were seen; the prevalence of overweight,

breakfast skipping, physical inactivity and fast food consumption were significantly higher in young adults from a low SES background as compared to a high SES background.

Longitudinal Changes in the Prevalence of Weight-Related Outcomes by Family-Level SES

The adjusted prevalence of overweight ($p<.001$) and screen use ($p<.001$) significantly increased in the sample overall, while breakfast skipping ($p=.01$) and physical inactivity ($p<.001$) significantly decreased from EAT-I to EAT-III. There was no statistically significant change in the prevalence of frequent fast food intake over time ($p=0.15$). When longitudinal changes were examined by family-level SES (Figure 1), a significant SES-by-time interaction was observed in the prevalence of overweight ($p=.01$), whereby the prevalence increased to a greater extent in those from low SES backgrounds: by 31 percentage points for low SES, 27 for middle SES, and 22 for high SES backgrounds. For fast food intake, the 10-year change was significantly different between young adults from low (increased by 6 percentage points) and high SES backgrounds (decreased by 1 percentage point) between EAT-I and EAT-III ($p=0.042$).

Prevalence of Weight-Related Outcomes by Educational Attainment in Young Adulthood

Table 2 presents young adult weight-related outcomes as a function of both baseline family-level SES and educational attainment in young adulthood. There was a trend toward improved outcomes for young adults from low SES backgrounds who attain higher educational status across all weight-related outcomes examined, though there were few differences that reached statistical significance. The prevalence of overweight was lower for young adults from low SES backgrounds who completed a bachelor's degree as compared to a high school diploma (50% vs. 62%, respectively); those from high SES backgrounds who completed a bachelor's degree had the lowest prevalence of overweight (40%). Benefits were also observed for behavioral outcomes and were greater for those from high and middle SES backgrounds than low SES backgrounds. For example, among young adults from high SES backgrounds: 29%, 15% and 14% who completed a high school diploma, a vocational/associate degree, or a bachelor degree, respectively, consumed fast food 3 times/week.

The most striking differences were between those with consistently high and consistently low SES (i.e., those who experienced a high SES during adolescence and achieved a high level of educational attainment in young adulthood and vice versa). The prevalence of overweight in young adulthood was 62% among consistently low SES participants, while only 40% among consistently high SES participants; similar trends were seen for behavioral outcomes.

Discussion

This study sought to determine if longitudinal changes in overweight and weight-related behaviors from adolescence to young adulthood were different according to family-level SES and if greater educational attainment was protective of weight-related health in young adults. Overall, we found that young people who experienced some level of socioeconomic disadvantage throughout their life, assessed by their parents' and their own educational attainment, had less favorable weight outcomes than those with greater socioeconomic

advantage. We also found some evidence that those adolescents from low, middle, and high SES backgrounds who attain a greater level of early adult education experience more favorable outcomes in their diet, activity and weight status. While these behavioral/weight trends were not always statistically significant, may have occurred before or after young adults completed their education, and should be confirmed in other studies - it is important to note that these findings suggest that it might not be all about what you're born into, but that educational attainment may have a buffering effect for weight-related health. Efforts to close socioeconomic gaps in overweight and weight-related behaviors in adolescents and young adults are needed.

The transition from adolescence to young adulthood has been identified as a critical time during which some less healthful behavioral patterns set in and young people are at risk for developing overweight.^{16,29,30} We found that increases in overweight and fast food intake during this transition were less favorable for those who experienced a low SES as compared to high SES in adolescence. These results extend prior findings from Project EAT that have also shown steeper increases in overweight status from early to late adolescence in low SES versus high SES families.¹⁴

From a lifecourse perspective, there is evidence that early life and cumulative disadvantage have impacts on obesity.^{15,31} We found evidence for these linkages in the present study, both for overweight and less healthful eating and activity behaviors. Young adults who experienced low SES in adolescence exhibited consistently poorer weight-related outcomes, regardless of early adult educational attainment, when compared to those who experienced high SES in adolescence.

On the other hand, many adolescents in our sample were socially mobile (shifted from a lower to higher social status: 44% of low SES adolescents completed some form of post-secondary education) and we found some evidence that the negative outcomes associated with a low SES background are attenuated by greater educational attainment in young adulthood. These findings are cross-sectional, but do add support for a protective role of social mobility, which has been found to buffer several negative health outcomes in the literature.^{31,32} Similar to our study, a study of Australian young women (aged 18-24) examined over 4 years reported a greater increase in BMI for those with lower parent educational attainment, who attained a lower educational level themselves, and who were less socially mobile (did not achieve a greater level of education and occupation level than their parents).³¹ However, the direction of this association is not entirely clear. In the Add Health cohort, adolescent socioeconomic adversity was associated with greater increases in BMI through young adulthood, and these increases mediated the relationship between high adolescent SES and low socioeconomic attainment in young adulthood.¹⁵ Overweight adolescents who experience stigma and marginalization in school might not pursue higher education (becoming less mobile),³³ while adolescents who successfully lose weight may be more likely to attend college (becoming more mobile). The extent to which these factors played out in our study are unknown and so results should be interpreted with caution.

The role of social mobility has not been widely studied in relation to specific weight-related behaviors in adolescents.³⁴ Lower perceived social mobility (examined as anticipated future

social position as compared to current perceived social position with society) of Mexican adolescents living in poverty was associated with a range of weight-related behaviors, including fast food, soda, physical inactivity and screen time.³⁴ In the United States, there are concerns that social mobility is declining, and steps to increase social mobility are complex and involve attention to race, discrimination, job opportunities, home ownership, economic independence, and social capital^{35,36} However, efforts to increase social mobility by increasing accessibility to postsecondary education for low SES youth has been recommended by others,³⁷ and based on the findings from this study, may have positive impacts on the weight-related health of young people.

Socioeconomic disparities in overweight and weight-related behaviors observed in this study are likely driven by differences in opportunities for physical activity and healthy eating in the neighborhood environment,^{38,39} targeted advertising by the food industry,⁴⁰ weight stigma and discrimination,⁴¹ or factors such as financial constraints, greater exposure to stressors, and social norms.¹³ This study did not examine if environmental factors (e.g. food availability) explained or mediated socioeconomic disparities, but previous studies have found neighborhood and school-level disadvantage to be independent predictors of obesity, suggesting that both physical and social systems in which individuals operate greatly impact their health risk.^{3,42} For these reasons, current obesity prevention efforts focusing on the individual may be contributing to socioeconomic inequalities in weight and structural interventions that target the environment in which behaviors occur are critically needed to reduce socioeconomic inequalities in obesity.⁴³ Lessons can be learned from tobacco control efforts that demonstrated structural interventions, such as taxation and public policy, were most effective at reducing socioeconomic inequalities in smoking.⁴⁴

A considerable strength of this study was the large, longitudinal cohort that assessed both changes in weight status, weight-related behaviors and socioeconomic disadvantage across 10 years. Several study limitations also need to be considered when interpreting the results. The directionality of the relationships examined is uncertain, as behaviors may have changed before or after educational attainment or as a result of other, unmeasured factors. Although data were drawn from a diverse sample, small cell sizes also precluded our examination of patterns in both SES and race/ethnicity over time. Measures relied on adolescent and young adult self-report and are susceptible to reporting bias and measurement error. Nevertheless, studies carried out to examine the validity of the BMI and physical activity measures increase our confidence in their validity.⁴⁵ The measure of family-level SES and models of social mobility were primarily driven by education level and additional measures of social disadvantage (e.g., occupational status or income) may have elucidated additional socioeconomic patterns in weight-related health. Finally, several statistical tests were performed in this study, which may lead to spurious associations.

Conclusions

The prevalence of overweight and weight-related behaviors, including fast food intake, breakfast skipping, physical inactivity, and screen use were socioeconomically patterned. These differences were found in adolescence, in young adulthood, and in longitudinal changes from adolescence to young adulthood. In addition, the findings suggest a trend

toward better weight-related outcomes for young adults from low SES backgrounds who attain higher educational status. To be effective, public health interventions need to reach adolescents and young adults in low SES groups and be rigorously designed and evaluated so that they do not contribute to widening gaps in weight-related health. The best hope for reducing inequalities in overweight and related behaviors may be structural interventions (e.g., national/state policies including soda taxes and marketing restrictions; increasing availability of healthy foods in schools/workplaces) that can have an impact across the socioeconomic gradient and should be tested in future research.⁴³ Efforts to improve access to postsecondary education for adolescents from low SES families may also contribute to improvements in weight-related health.

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Highlights

- We examined socioeconomic patterns in young people's weight-related health
- Low SES adolescents experienced greater increases in overweight over time
- Low SES adolescents experienced greater increases in fast food intake over time
- Education as a young adult may buffer against poor impacts of a low SES adolescence

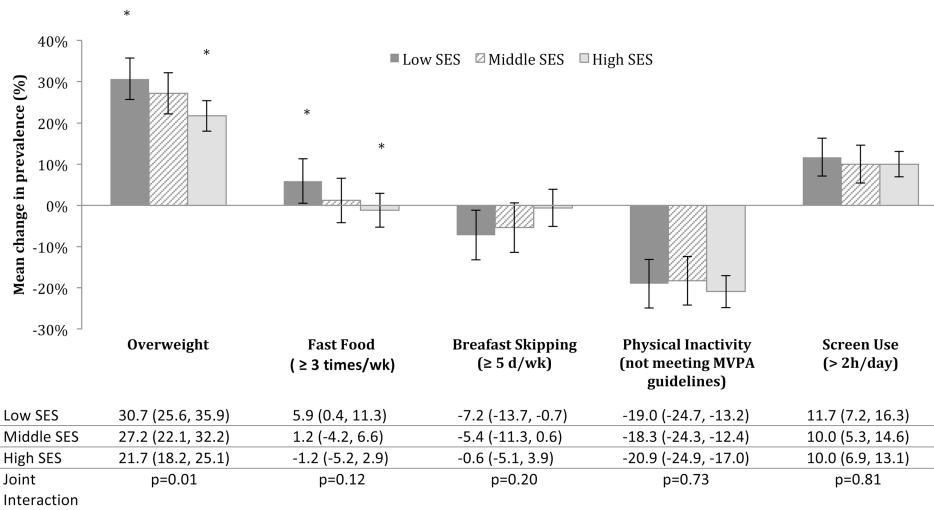


Figure 1. Mean change in prevalence (95% CI) of overweight and selected weight-related behaviors from adolescence (EAT-I; 1999) to young adulthood (EAT-III; 2009) by low, middle and high family-level socioeconomic status (SES)
 Predicted mean changes/differences in percentage points are adjusted for age, sex, ethnicity and weighted for loss-to-follow. Asterix indicates significant group differences (overweight:p=.004; fastfood: p=.042). Participants were recruited from schools in Minneapolis/St.Paul, MN, USA at baseline.

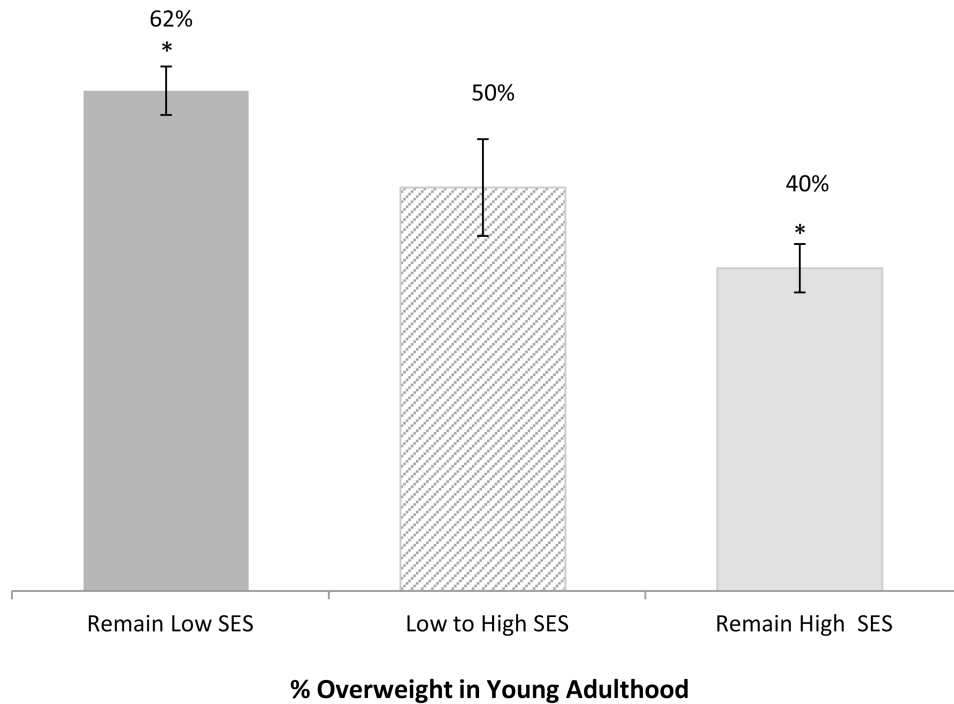


Figure 2. Adjusted prevalence of overweight among young adults (EAT-III; 2009) across three key family-level socioeconomic status (SES) and educational attainment categories
Remain Low SES=young adults from a low socioeconomic background with no more than high school education; **Low to High SES** = young adults from a low socioeconomic background who completed a Bachelor or professional degree; and **Remain High SES**=young adults from the highest socioeconomic background and who completed a Bachelor or professional degree. * indicates a statistically significant difference between groups, $p < .001$. Young adult participants of Project EAT recruited from schools in Minneapolis/St. Paul, MN, USA at baseline.

Table 1
Demographic characteristics and weight-related outcomes in adolescence (EAT-I; 1999) and young adulthood (EAT-III; 2009), and by family-level socioeconomic status (SES) among participants in Project EAT^a

	Family-level SES				p-value ^b
	Low SES N=814	Middle SES N=577	High SES N=811	Total Sample N=2,203	
	% (n)	% (n)	% (n)	% (n)	
Sex					
Boys	44.8 (987)	43.6 (355)	43.0 (248)	47.3 (384)	.288
Girls	55.2 (1,216)	56.4 (460)	57.0 (329)	52.7 (427)	
Race/Ethnicity					
White	50.0 (1089)	27.9 (225)	49.8 (282)	72.5 (581)	
Black	18.5 (402)	22.5 (182)	22.6 (128)	11.5 (92)	
Hispanic	5.9 (129)	9.1 (73)	5.5 (31)	3.1 (24)	<.001
Asian	18.2 (397)	30.8 (249)	15.9 (90)	7.2 (58)	
Other/Mixed	7.4 (161)	9.8 (79)	6.3 (36)	5.8 (47)	
Educational Attainment					
High School	42.9 (911)	56.3 (438)	45.5 (253)	27.8 (220)	
Vocational Degree	25.3 (538)	26.6 (207)	30.4 (169)	20.5 (162)	<.001
Bachelor Degree	31.9 (677)	17.2 (134)	24.1 (134)	51.8 (410)	
Overweight					
EAT-I	25.7 (522)	30.7 (227)	25.1 (132)	21.3 (163)	.002
EAT-III	52.0 (1056)	61.8 (445)	52.5 (283)	42.4 (328)	<.001
Fast Food Intake, 3 times/wk					
EAT-I	21.2 (466)	21.8 (178)	23.4 (134)	19.2 (155)	.25
EAT-III	23.0 (502)	27.7 (222)	23.8 (135)	17.8 (144)	<.001
Breakfast Skipping, 5 d/wk					
EAT-I	41.0 (895)	49.1 (398)	43.9 (250)	30.7 (248)	<.001
EAT-III	36.5 (804)	41.7 (339)	38.5 (222)	30.0 (243)	<.001
Physical Inactivity, not meeting MVPA guidelines^c					
EAT-I	61.1 (1296)	66.5 (520)	64.7 (352)	53.3 (424)	<.001

	Family-level SES				p-value ^b
	Low SES N=814	Middle SES N=577	High SES N=811	Total Sample N=2,203	
EAT-III	42.4 (934)	48.5 (395)	33.4 (271)	42.4 (934)	<.001
Screen Use, > 2 hours/d					
EAT-I	75.8 (1602)	78.1 (603)	73.4 (584)	75.8 (1602)	.14
EAT-III	85.6 (1884)	87.9 (716)	84.1 (682)	85.6 (1884)	.11

SES, socioeconomic status; MVPA, moderate-to-vigorous physical activity

The sample size for different variables may vary due to a small number of missing responses; weighted data are presented

^aParticipants were recruited from schools in Minneapolis/St. Paul, MN, USA at baseline

^bStatistical differences across socioeconomic categories based on the likelihood ratio test

^c% not meeting guidelines (<7h/wk for adolescents at EAT-I and <2.5h/wk for young adults at EAT-III)

Table 2

The adjusted prevalence of overweight and selected weight-related behaviors among young adults (EAT-III; 2009)^a from low, middle and high SES families according to their highest level of educational attainment.

	Educational Attainment		
	High School	Vocational Degree	Bachelor Degree
Family-level SES	<i>% Overweight</i>		
Low SES	62.6 (56.6-68.6) ^a	62.9 (54.2-71.6) ^a	50.2 (39.1-61.3) ^{ab} c
Middle SES	53.9 (46.8-61.1) ^{ab}	55.5 (46.3-64.7) ^{ab}	44.7 (35.4-54.0) ^{bc}
High SES	46.4 (39.3-53.6) ^{bc}	50.0 (40.8-59.1) ^b	39.6 (34.3-44.9) ^c
	<i>Fast Food, 3 times/week</i>		
Low SES	24.0 (18.9-29.0) ^a	31.8 (23.6-39.9) ^a	26.7 (16.0-37.4) ^{ab}
Middle SES	27.9 (21.5-34.3) ^a	24.5 (16.9-32.1) ^{ab}	13.2 (6.1-20.3) ^c
High SES	29.1 (22.8-35.4) ^a	15.4 (9.6-21.3) ^{bc}	13.7 (10.4-17.0) ^c
	<i>Breakfast Skipping, 5 days/week</i>		
Low SES	42.3 (36.4-48.2) ^a	38.3 (30.0-46.7) ^{ab}	38.3 (26.9-49.6) ^{ab}
Middle SES	44.6 (37.8-51.4) ^a	37.7 (29.2-46.2) ^{ab}	29.4 (21.1-37.6) ^{bc}
High SES	44.2 (37.3-51.1) ^a	37.0 (28.9-45.1) ^{ab}	21.9 (18.0-25.8) ^c
	<i>Physical Inactivity, % not meeting MVPA guidelines</i>		
Low SES	49.0 (43.0-55.0) ^a	46.4 (37.7-55.0) ^{ab}	35.3 (25.4-45.3) ^{bc}
Middle SES	59.8 (43.1-56.5) ^a	46.1 (37.6-54.6) ^{ab}	40.7 (32.1-49.4) ^{ab}
High SES	43.5 (36.4-50.6) ^{ab}	45.4 (37.3-53.5) ^{ab}	28.9 (24.0-33.8) ^c
	<i>Screen Use, > 2 hours/day</i>		
Low SES	88.4 (84.2-92.5) ^a	86.0 (79.8-92.1) ^{ab}	86.2 (79.8-92.7) ^{ab}
Middle SES	84.1 (78.6-89.6) ^{ab}	85.5 (79.1-91.8) ^{ab}	85.9 (80.3-91.4) ^{ab}
High SES	86.7 (81.5-91.8) ^{ab}	88.7 (84.4-93.0) ^a	82.7 (79.5-86.0) ^b

SES, socioeconomic status; MVPA, moderate-to-vigorous physical activity

Superscript letters distinguish significant differences ($p < 0.05$) between the nine family-level SES and educational attainment categories for each weight-related outcome.

^aYoung adult participants of Project EAT recruited from middle/high schools in Minneapolis/St. Paul, MN, USA at baseline.