The Association of Race, Socioeconomic Status, and Health Insurance Status With the Prevalence of Overweight Among Children and Adolescents

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Objectives. We examined the effect of race, socioeconomic status, and health insurance status on the prevalence of overweight among children and adolescents.

Methods. We studied an observational cohort from the 1996 Medical Expenditure Panel Survey Household Component.

Results. In the younger group, both Black and Latino children had a greater likelihood of being overweight compared with White children. Among the adolescent group, Latinos and Asian/Pacific Islanders were more likely to be overweight. Among adolescents, lacking health insurance and having public insurance were both positively associated with the prevalence of overweight. A relationship between insurance status and overweight was not observed for younger children.

Conclusions. There are substantial racial differences in the prevalence of overweight for children and adolescents. Health insurance status is associated with the prevalence of overweight among adolescents. (*Am J Public Health.* 2003;93:2105–2110)

The prevalence of overweight among children and adolescents in the United States has been steadily increasing over the past 4 decades.[1,2] A recent study from the Centers for Disease Control and Prevention (CDC) indicates that approximately 14% of children and 12% of adolescents are overweight.[1]

The prevention and treatment of overweight among children and adolescents are important to reduce the risk of health complications in both childhood and adulthood.[3–5] Overweight children and adolescents are more likely to be overweight in adulthood.[6] Because adults are rarely able to achieve sustained weight loss,[7] it is essential to prevent and treat overweight in childhood and adolescence.[8] Also, the treatment of overweight in children may avert the onset of cardiovascular complications of overweight that become evident in adulthood. Additionally, overweight adolescents complete fewer years of education, are less likely to marry, and have a lower household income in adulthood, independent of familial socioeconomic status.[9]

Overweight among children and adolescents is a complex health problem related to several factors including parental weight,[6] socioeconomic status,[10] early childhood nutrition,[11] level of physical activity,[12] and engagement in sedentary activities such as watching television.[12–14] The literature also suggests that different ethnic groups may face unique sets of risk factors for overweight.[12,13,15,16] The effect of race/ethnicity on the prevalence of childhood overweight requires greater study, particularly in relation to socioeconomic status. Insurance status may be associated with the prevalence of overweight among children and adolescents, because the uninsured may face barriers to receiving health care, which make medical prevention and treatment difficult.[17]

In this study we examine factors associated with the prevalence of overweight in children aged 6 to 11 years and adolescents aged 12 to 17 years, and specifically examine the rates of overweight among non-Latino White (hereafter referred to as White), non-Latino Black (hereafter referred to as Black), Latino, and Asian/Pacific Islander youth. We also explore the association of health insurance status with the prevalence of overweight during childhood and adolescence.

METHODS

Data

This analysis is based on data from the 1996 iteration of the Medical Expenditure Panel Survey (MEPS) Household Component, a nationally representative sample of the US civilian, noninstitutionalized population.[18] The MEPS Household Component provides data on demographic characteristics, health status, health care use, access to care, and insurance status. The MEPS data were collected through 6 rounds of interviews for each participating household over a 2.5-year period. The response rate for MEPS was high; 77.7% of individuals eligible for the survey were interviewed for the first round.

Data from the 1996 panel were available for 8652 families and 21 571 individuals.[19] Blacks and Latinos were oversampled. For this analysis, we included 3775 children and adolescents aged 6 to 17 years who had their race/ethnicity described as White, Black, Latino, or Asian/Pacific Islander and who had complete data.

Variables

Information about the height and weight of children and adolescents had been reported in the interviews by the head of the household. Information to calculate a child's body mass index (BMI) was reported in round 2 of these interviews. We defined "overweight" as having a BMI of at least the 95th percentile for age and sex as defined by the CDC's BMI-for-age charts.[20] The percentiles for BMI in these charts are derived from a series of national health examination surveys collected between 1963 and 1994.[20] The BMI is the best and most widely used surrogate measure of adiposity,[21] and it is correlated with direct measures of adiposity.[22,23] This definition has also been used in the literature.[1,2,6,9] The

95th percentile of BMI in children and adolescents is associated with risk of overweight and cardiovascular disease in adulthood.[24]

Our principal independent variables were race/ethnicity, measures of socioeconomic status, and health insurance status. Respondents were categorized as Black, Latino, Asian/Pacific Islander, or White based on the report of the head of household. We also examined the effect of the child's country of birth (respondents were coded as US vs foreign). Measures of socioeconomic status included the highest parental educational attainment (coded as 12 years or less vs more than 12 years), household income (coded as less than 125% of the poverty level vs at least 125%), whether currently receiving support from the Aid to Families With Dependent Children (AFDC) program (coded as yes/no), and whether the child lived in a single-parent household. Health insurance status was coded as uninsured, publicly insured, or privately insured. Public insurance is defined in MEPS as Medicaid, Medicare, or other public hospital/physician coverage. Children who were insured and not covered by a public program were considered to have private insurance. Other independent variables examined included age (continuous), sex, and region of the United States (Northeast, Midwest, South, or West).

TABLE 1—Demographics of the Study Sample by Age and Race[a]

Characteristic	Ages 6 to 11, %				Ages 12 to 17, %			
	White (n = 1039)	Black (n = 313)	Latino (n = 464)	Asian/Pacific Islander (n = 46)	White (n = 1058)	Black (n = 313)	Latino (n = 496)	Asian/Pacific Islander (n = 46)
Female	47.3	51.2	49.9	41.3	47.1	45.9	48.4	54.2
Highest parental education ≤ 12 years	37.1	52.3	62.5	17.9*	38.7	54.8	67.3	30.2*
Foreign-born	2.2	2.5	7.3	27.6*	2.2	2.4	19.0	42.3*
Household income < 125% of federal poverty level	16.4	41.7	42.1	24.0*	13.6	39.6	47.2	24.7*
Single-parent family	20.0	54.9	24.0	7.5*	18.0	48.1	28.6	2.1*
Currently receiving AFDC	2.1	12.4	11.2	4.4*	1.1	8.9	10.8	6.4*
Health insurance status								
Uninsured	8.7	9.8	19.7	8.0*	8.4	13.2	27.1	9.3*
Public insurance	10.7	37.7	34.7	22.1	7.7	33.3	28.6	20.7
Private insurance	80.6	52.5	45.7	69.9	84.0	53.5	44.3	70.1
Region								
Northeast	19.2	18.3	18.2	18.7*	19.4	17.6	18.4	13.7*
Midwest	29.0	18.3	7.5	1.9	29.9	15.9	7.6	10.7
South	31.5	54.8	28.7	11.7	31.2	56.5	30.8	12.1
West	20.4	8.5	45.6	67.8	19.6	10.1	43.3	63.5

Note. AFDC = Aid to Families With Dependent Children.
[a]Totals may not add to 100% because of rounding.
*$P < .05$ for comparison across racial groups.

Statistical Analysis

We used weighted logistic regression models to examine factors associated with overweight separately among children aged 6 to 11 years and among adolescents aged 12 to 17 years. We estimated these models with SAS (SAS Institute Inc, Cary, NC) and SUDAAN (Research Triangle Institute, Research Triangle Park, NC) software using sampling weights to reflect the US civilian, noninstitutionalized population and standard error adjustment to account for the complex survey design.[19] Analyses also adjusted for clustering of children within families using generalized estimating equations.[25] We chose independent variables on the basis of our previous research and their statistical relationships with the dependent variables.

We used the behavioral model developed by Andersen to explore the influence of predisposing and enabling characteristics.[26] We ran 2 sets of models. The first included only predisposing variables (age, sex, race, country of birth, parental educational attainment, household income, number of parents in the household, and region), and the second included these predisposing variables as well as enabling variables (receipt of AFDC and health insurance status).

RESULTS

Study Population

There were substantial differences in demographic characteristics by race for both age groups (Table 1). For example, Latino and Asian/Pacific Islander children were more likely than Black or White children to be foreign-born. Blacks had the highest rate of poverty, whereas Whites had the lowest. Latinos had the highest rates of uninsurance in both age groups. There was substantial racial variation of the sample by region. The overall rate of overweight was more than 2 times greater among younger children than among adolescents (26.9% vs 11.2%; $P < .001$).

Factors Associated With Overweight Among Children Aged 6 to 11 Years

In Model 1, the model that contained only predisposing variables, boys had a significantly greater risk of overweight than girls (odds ratio [OR] = 1.34; 95% confidence interval [CI] = 1.03, 1.75) (Table 2). With respect to race/ethnicity, both Black (OR = 2.26; 95% CI = 1.62, 3.14) and Latino (OR = 1.99; 95% CI = 1.46, 2.73) children had a greater likelihood of being overweight compared with White children. After including factors that enabled access to health care services (Model 2), children from families with lower parental educational attainment (OR = 1.38; 95% CI = 1.05, 1.82) and from households with an income below 125% of the federal poverty level (OR = 1.43; 95% CI = 1.00, 2.04) also had a greater risk of overweight, compared with more advantaged children. Receipt of AFDC was associated with a lower prevalence of obesity (OR = 0.52; 95% CI = 0.31, 0.88). Country of birth, single-parent household status, health insurance status,

TABLE 2—Factors Associated With Overweight Among Children Aged 6 to 11 Years

Characteristic	Unadjusted Rate, %[a]	Model 1[b] Adjusted OR (95% CI)	Model 2[c] Adjusted OR (95% CI)
Gender			
Female	24.5	1.00	1.00
Male	29.1	1.34 (1.03, 1.75)	1.34 (1.03, 1.75)
Race/ethnicity			
White	21.1	1.00	1.00
Black	43.9	2.26 (1.62, 3.14)	2.39 (1.69, 3.39)
Latino	37.4	1.99 (1.46, 2.73)	2.09 (1.51, 2.89)
Asian/Pacific Islander	19.6	0.83 (0.34, 2.01)	0.88 (0.37, 2.14)
Country of birth			
US-born	27.1	1.00	1.00
Foreign-born	20.0	0.87 (0.38, 1.99)	0.84 (0.36, 1.96)
Highest parental educational attainment			
≤ 12 years	32.5	1.32 (1.00, 1.74)	1.38 (1.05, 1.82)
> 12 years	22.8	1.00	1.00
Household income			
< 125% of federal poverty level	36.9	1.19 (0.87, 1.64)	1.43 (1.00, 2.04)
≥ 125% of federal poverty level	23.7	1.00	1.00
Single-parent household			
Yes	34.7	1.19 (0.88, 1.61)	1.32 (0.97, 1.81)
No	24.2	1.0	1.00
Region			
Northeast	20.7	0.79 (0.56, 1.13)	0.79 (0.56, 1.13)
Midwest	24.2	1.16 (0.78, 1.74)	1.14 (0.76, 1.71)
South	33.3	1.36 (0.97, 1.90)	1.31 (0.94, 1.83)
West	25.0	1.0	1.00
Currently receiving AFDC			
Yes	28.2	...	0.52 (0.31, 0.88)
No	26.8	...	1.00
Health insurance status			
Uninsured	32.3	...	1.12 (0.78, 1.60)
Public insurance	34.0	...	0.77 (0.50, 1.18)
Private insurance	24.3	...	1.00

Note. OR = odds ratio; CI = confidence interval; AFDC = Aid to Families With Dependent Children.
[a]The unadjusted rates are weighted to reflect the US population.
[b]Model 1 adjusted for predisposing factors only (age, sex, ethnicity, country of birth, highest parental educational attainment, household income, single-parent household, and region).
[c]Model 2 adjusted for Model 1 variables plus enabling factors (receipt of AFDC and health insurance status)

and region of the United States were not associated with the prevalence of overweight for children in the multivariate models.

Factors Associated With Overweight Among Adolescents Aged 12 to 17 Years

In Model 1, boys were more likely than girls to be overweight (OR=1.49; 95% CI=1.07, 2.09) (Table 3). Asian/Pacific Islanders (OR=4.35; 95% CI=1.89, 10.00) and Latinos (OR=1.82; 95% CI=1.18, 2.82) were significantly more likely than Whites to be overweight. The rates of overweight for White and Black adolescents were similar. In Model 2, poverty was associated with a lower prevalence of overweight (OR=0.53; 95% CI=0.34, 0.83). Lack of insurance (OR=2.22; 95% CI=1.35, 3.66) and having public insurance (OR=1.96; 95% CI=1.17, 3.29) were significantly associated with an increased prevalence of overweight. Country of birth, single-parent household status, and region of the United States were not significantly associated with the prevalence of overweight among adolescents.

DISCUSSION

This study confirms substantial rates of overweight among children and adolescents in the United States.[1,2,27] For adolescents, the prevalence of overweight in this sample is similar to what has been described in other nationally representative samples using the definition given here.[1,2,27] However, for younger children, the rate reported in this sample is higher than what has been observed by others, possibly due either to differences in the prevalence of obesity in this sample or to differences in measurement of the outcome.[1,2]

This study is among the first to include both Latino and Asian/Pacific Islander youth[3] in addition to Whites and Blacks.[10] This study also provides information about the association between health insurance status and the prevalence of overweight in childhood. Lack of health insurance is positively associated with the prevalence of overweight among adolescents. Our findings suggest that distinct factors are associated with overweight for these 2 age groups. Whereas the prevalence of overweight appears to be more linked to family circumstances for children, the prevalence for adolescents is more associated with individual characteristics. Finally, there are significant ethnic disparities in the rate of overweight during childhood. Importantly, the prevalence for specific ethnic groups differs between the 2 age groups.

There are significant ethnic disparities in the rate of childhood and adolescent overweight. Distinct age-related patterns of overweight emerged for Blacks, Latinos, and Asian/Pacific Islanders. In childhood, Latinos and Blacks were more likely to be overweight than Whites. Yet, in adolescence, Latinos and Asian/Pacific Islanders experienced a higher prevalence of overweight. The reasons for ethnic variation in the rate of overweight are complex and are beyond the scope of this study, but previous literature suggests that this variation may be related to lifestyle, acculturation, and cultural beliefs and practices. Among Latinos, a higher BMI may be related to language preference and duration of resi-

TABLE 3—Factors Associated With Overweight Among Adolescents Aged 12 to 17 Years

Characteristic	Unadjusted Rate, %[a]	Model 1[b] Adjusted OR (95% CI)	Model 2[c] Adjusted OR (95% CI)
Gender			
Female	9.6	1.00	1.00
Male	12.5	1.49 (1.07, 2.09)	1.50 (1.07, 2.09)
Race/ethnicity			
White	9.4	1.00	1.00
Black	13.4	1.32 (0.82, 2.12)	1.18 (0.72, 1.94)
Latino	15.7	1.82 (1.18, 2.82)	1.60 (1.01, 2.52)
Asian/Pacific Islander	20.1	4.35 (1.89, 10.00)	4.26 (1.89, 9.62)
Country of birth			
US-born	11.1	1.00	1.00
Foreign-born	12.4	0.73 (0.40, 1.34)	0.68 (0.37, 1.25)
Highest parental educational attainment			
≤ 12 years	13.3	1.46 (0.97, 2.19)	1.32 (0.89, 1.97)
> 12 years	9.4	1.00	1.00
Household income			
< 125% of federal poverty level	12.1	0.72 (0.47, 1.09)	0.53 (0.34, 0.83)
≥ 125% of federal poverty level	10.9	1.00	1.00
Single-parent household			
Yes	13.9	1.34 (0.86, 2.09)	1.32 (0.84, 2.07)
No	10.3	1.00	1.00
Region			
Northeast	11.2	1.44 (0.88, 2.36)	1.42 (0.86, 2.33)
Midwest	10.2	1.34 (0.82, 2.18)	1.34 (0.81, 2.21)
South	12.3	1.55 (0.98, 2.48)	1.54 (0.98, 2.43)
West	10.4	1.00	1.00
Currently receiving AFDC			
Yes	15.1	...	0.84 (0.38, 1.84)
No	11.0	...	1.00
Health insurance status			
Uninsured	18.6	...	2.22 (1.35, 3.66)
Public insurance	15.0	...	1.96 (1.17, 3.29)
Private insurance	9.2	...	1.00

Note. OR = odds ratio; CI = confidence interval; AFDC = Aid to Families With Dependent Children.
[a]The unadjusted rates are weighted to reflect the US population.
[b]Model 1 adjusted for predisposing factors only (age, sex, ethnicity, country of birth, highest parental educational attainment, household income, single-parent household, and region).
[c]Model 2 adjusted for Model 1 variables plus enabling factors (receipt of AFDC and health insurance status).

dence in the United States.[28] The rate of overweight among immigrant Asian/Pacific Islanders also increases with a greater number of years in the United States.[28] Differing attitudes toward body image may also explain ethnic differences in the rates of overweight, because Black mothers and adolescents may prefer a heavier body size than Whites.[15,29,30] Overweight is associated with lower self-esteem among Latino adolescents, but not among Black adolescents.[31] The Youth Risk Behavior Surveillance Survey reports that White female high school students are more likely than Blacks and Latinos to exercise to lose or maintain their weight.[32]

The prevalence of overweight among younger children appears to be more closely associated with family circumstances, whereas among adolescents the prevalence is more associated with individual characteristics. Children of parents with fewer years of education or lower household income were more likely to be overweight. Previous studies have also demonstrated an inverse relationship between parental education and childhood overweight.[10,13,15,33] Parental educational attainment may influence a child's risk of overweight by several mechanisms. For example, parents with less education may be less knowledgeable about the role of nutrition and physical fitness in weight loss.[34,35]

In contrast to overweight among younger children, overweight among adolescents appears to be more insulated from the effects of parental influences. Parental education may be less important because adolescents may possess more health knowledge and exercise greater independent decisionmaking about their food choices and physical activity. Adolescents encounter competing influences regarding weight control behavior from sources beyond their family, including peers and the media.[36,37]

Household income appears to influence the prevalence of overweight among adolescents. Although a previous study reports a lower risk of overweight among adolescents from households with higher incomes,[10] this study finds that adolescents from higher-income households were more likely to be overweight than their lower-income counterparts. Such conflicting findings indicate the need for further research into the relationship between socioeconomic status and the prevalence of overweight among adolescents.

The association of health insurance status with overweight was different for the 2 age groups. During childhood, health insurance status was not associated with overweight. During adolescence, however, having private health insurance demonstrated a protective association. In addition, adolescents with public insurance were more likely to be overweight than children with private insurance. Younger children may have better access to the medical care system regardless of insurance status because of the need for routine immunizations required for school attendance. For adolescents, having private insurance may be an important resource for facilitating access to health services, because fewer publicly funded health programs are available for adolescents than for younger children.[38,39] If overweight adolescents are more likely to

lose their health insurance, that could also explain this association.

Our study suggests that interventions for children and adolescents may need to be tailored to the factors associated with overweight for each age group. Given the relationships observed in this study, interventions tailored to the 6- to 11-year-old age group may be more successful if they focus on parental participation. Parents need to guide a child's eating habits, support physical activity,[40] and reduce television viewing.[14] Interventions for overweight adolescents may need to be more individually focused than family-oriented. Our findings suggest the importance of health insurance for the prevention and treatment of adolescent overweight. Compared with younger children, adolescents are more likely to have unmet health needs because they lack health insurance.[38] School-based overweight prevention and treatment programs may provide an alternative to medically based programs. School-based outreach may be effective by integrating nutrition education into the curriculum, promoting discussion among peer groups, and providing healthy food choices in the cafeteria.[41]

Disparities in the rate of overweight among different ethnic groups suggest the need for tailored interventions that take into account cultural, dietary, and lifestyle issues.[15,28–30] Important distinctions include perceptions of ideal body weight[15,29,31] and decisionmaking influences.[29] Adolescent Black girls' perceptions of body size are more influenced by family members, whereas peer group standards play a greater role in the body image perception of adolescent White girls.[29] Also, the number of hours spent watching television or videos per week is greater for Black than for White youths.[12]

Latino ethnicity was associated with a greater prevalence of overweight during both childhood and adolescence. Latino children and adolescents may be especially vulnerable to barriers to health care.[42] Although our study did not find immigrant status to be a significant factor, other research shows acculturation to be important among adolescents.[28] To better serve Latino children and adolescents, interventions may need to provide culturally appropriate services.[43]

Despite a lower prevalence of overweight in childhood, Asian/Pacific Islanders were the most likely to be overweight in adolescence compared with other ethnic groups. Similar to Latinos, Asian/Pacific Islander adolescents may face significant barriers to primary care and preventive services.[43] Dietary and lifestyle education may benefit Asian/Pacific Islander adolescents; a previous study found that Asian-American adolescents are at higher risk of a sedentary lifestyle.[12]

This study had several limitations. First, MEPS did not ascertain information about several known risk factors for childhood overweight, including parental overweight,[6] level of physical activity,[12] or specific dietary habits. Because these factors may be a more proximate cause of overweight than the factors described here, future studies should examine whether the racial and socioeconomic differences observed in this sample are explained by specific differences in health behaviors.

Second, all of these data came from parental report and were not validated by physical examination. We define overweight as relative to a population standard and not the absolute prevalence of overweight as measured by physical body fat distribution. This definition of overweight has been used by the CDC and other investigators to examine trends in childhood overweight.[1,2,20,27] BMI in children correlates well with laboratory measures of body fat.[44] This definition of overweight has also been shown to identify children with a significant likelihood of persistent overweight in adulthood.[24] Although the rate of overweight among adolescents reported here is similar to rates described in national surveys that are based on physical examination or self-report,[1,2,27] the rate of childhood overweight reported by these household respondents is significantly higher than the rates for samples based on clinical examination.[1,2] Parents may be less able to accurately recall the height and weight of younger children compared with adolescents. In general, however, the correlations between self-reported and measured values of BMI have been above 0.90.[45,46]

Third, the number of Asian/Pacific Islanders included in the study is small; this may limit our ability to find associations that truly exist. Fourth, the terms "Latino" and "Asian/Pacific Islander" include children and adolescents of many different ethnic origins. For example, we cannot examine whether differences exist between Latinos of Mexican American or Puerto Rican descent. Finally, because these data are observational, we cannot conclude that any of these factors cause overweight. Further research should confirm these findings and examine causal mechanisms so that appropriate interventions can be designed.

Pediatric overweight is a significant public health and social problem.[9,47] Overweight in childhood and adolescence can have lasting health and socioeconomic implications.[3–5,9] There are also significant racial disparities in the prevalence of overweight among different ethnic groups.[2,28,33] The association of health insurance status with the prevalence of adolescent overweight has not previously been documented. Future research should examine potential explanations for these disparities in overweight so that appropriate interventions can be designed. Unless effective interventions are designed and implemented, the persistent increase in the rate of overweight during childhood and adolescence may continue unabated, with important implications for the health status of the emerging adult population. ■

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Contributors

J.S. Haas planned the study, analyzed the data, and wrote the article. L.B. Lee analyzed the data and wrote the article. C.P. Kaplan assisted in data interpretation and in critical revisions. D. Sonneborn analyzed the data. K.A. Phillips assisted in data interpretation and in critical revisions. S.-Y. Liang analyzed the data and provided critical revisions.

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Human Participant Protection

This study was approved by the University of California, San Francisco institutional review board.

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