RACE, ETHNICITY, AND THE RELEVANCE OF OBESITY FOR SOCIAL INTEGRATION

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Objective: To examine race and ethnic differences in the importance of obesity for social integration using the National Longitudinal Study of Adolescent Health (Add Health).

Design: A cross-sectional study utilizing survey-adjusted statistics and multivariate logistic and linear regression models. Models were stratified by sex and included interaction terms capturing race, ethnicity and obesity.

Setting: United States of America.

Participants: A nationally representative sample of 15,355 respondents grades 7 through 12 who participated in both the In-School and In-Home Wave I surveys of Add Health.

Main Outcome Measures: Four self-reported and schoolmate-reported indicators of social integration.

Results: The consequences of obesity for social integration are greatest for White adolescents, who were selected by almost 2 fewer schoolmates as friends and had half the odds of having their friendships reciprocated compared with non-obese White adolescents. The social disadvantage of obesity was lower for non-White adolescents; though they are selected by significantly fewer schoolmates as friends and were less likely to have their friendships reciprocated, they did not face additional discrimination from being both obese and minority.

Conclusions: There are significant differences between obese and non-obese adolescents by race and ethnicity in friendships. As friendships are among the most valued assets in adolescence, understanding the impact of obesity on access to friendships for diverse adolescents is a necessary component to understanding the complex motivations that guide health-related behavior at these formative ages. (*Ethn Dis.* 2012;22[3]:317–323)

Key Words: Adolescence, Friendship, Obesity, Body Weight, Race, Ethnicity, Social Integration

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INTRODUCTION

Adolescence is a formative time, and perceptions of the self, interpersonal relationships, and health during this period are likely to have ramifications throughout life.[1] Social integration with peers and friends is important for social, cognitive, and emotional development during adolescence,[2] but these relationships are themselves shaped by individual characteristics such as race,[3] sex,[4] and body size.[4] Several studies have documented the social consequences of obesity in adolescence, which include teasing, discrimination, social, relational and physical victimization, and exclusion.[5–7] Given cultural differences in body acceptance,[8–10] obesity risk, and self-esteem[11] associated with weight among different races and ethnicities, the psychosocial consequences of obesity may be different across these groups. Our study explores how race and ethnicity may modify the relevance of obesity for social integration, including self-assessed peer acceptance, friendship formation, and friendship strength in adolescence.

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BACKGROUND

The negative social and psychological ramifications of adolescent obesity may be as damaging as the physical health consequences.[6] Previous studies have shown that obese children are less likely to be selected as friends than normal-weight children,[12] report spending less time with friends,[13] and are more likely to be rejected by their classmates.[14] Race and ethnicity may modify the relationship between obesity and social integration, as differences in the formation and characteristics of friendships have been documented among adolescents of different races and ethnicities. For example, Hispanic and Black adolescents maintain friendships for a longer time, while Asian American adolescents are least likely to form close friendships.[15] Asian, Hispanic, and Black boys tend to report higher levels of intimacy within their friendships relative to White adolescent boys.[15]

Similarly, obesity risks differ by racial and ethnic background.[16,17] A high body mass index (BMI) is more prevalent among non-Hispanic Black (22.9%) and Mexican American (21.1%) adolescents than among non-Hispanic White adolescents (16.0%),[16] and Asian youth (13.6%).[18] To add further complexity, obesity risks increase in immigrant groups by generation and time residing in the United States.[19]

The acceptance of obesity also varies across racial and ethnic groups. For instance, African American youth have been found to hold full-figured and overweight body types as the ideal,[10] have higher levels of body satisfaction and body acceptance, and less often exhibited unhealthy weight control behaviors and eating disorders than other races.[8,20] Self-esteem is protective

against believing one is overweight[21,22] and is higher among African American girls than among other girls.[11]

Latino adolescents identified larger body figures as their ideal body image more than did White adolescents and White adolescents experienced higher body dissatisfaction than Latinos.[23] Correspondingly, African American and Latino adolescents of both sexes have been shown to prefer larger body types[10] and identify thin peers as having such negative traits as being pretentious, having low self-esteem, being in worse health, and being less physically attractive.[10] Hispanic, Asian American, and Native American girls reported the same or more weight-related concerns as White girls, while weight concerns were more prevalent among Asian boys than White boys. [8] However, Asian-American youth may experience less weight-based teasing from peers and more from their family.[24]

MATERIALS AND METHODS

We used the National Longitudinal Study of Adolescent Health (Add Health), a school-based study of health and health-related behaviors of adolescents representative of the US population enrolled in high school in 1995. The first data collection was conducted in 1994–95 (in-school questionnaire) and included all students in the selected schools, with a sample of over 90,000 students.[25] The in-school questionnaire was followed by an in-home survey in 1995 (Wave I), in which about 200 students were recruited from each school, resulting in a self-weighting sample of 20,745 adolescents in grades 7 through 12.[25] Our sample is drawn from the 15,355 respondents who participated in both the in-school and in-home Wave I surveys. Data on friends were from the in-school questionnaire and individual information and anthropometrics were from the in-home instrument.

Variables

We used the 2000 CDC Growth Reference to calculate each child's BMI z-score, standardized to the reference population for the child's age and sex.[26] Cutoffs for normal weight, overweight, and obese were used according to the Child Obesity Working Group of the International Obesity Task Force.[27] These cutoffs correspond to adult BMI cutoff points of BMI$<$25kg/m^2 for normal weight, BMI 25–29.99 for overweight, and BMI$\geq$30for obese.

To assess social integration, we examined both self-reported and schoolmate reported indicators of close friendships. Respondents were asked to nominate up to five male and five female friends from a school roster provided by each school, or from among their out-of-school friends. We restricted our definition of friend to same-sex friends because over 95% of cross-sex friendships during adolescence are romantic[28,29] and these may be affected differently by body weight and by race/ethnicity. Using self-reports on friendships, we determined: whether the index student reported any same-sex friends; and the total number of same-sex friends reported. Linking students with the responses of schoolmates, we examined: the number of schoolmates who identified the index student as one of their five same-sex friends; and whether the person named first by the index child as a friend also named him or her as a friend in their own Add Health interviews, among those who reported having a best friend in school.

Adolescents were first asked whether they were of Hispanic origin and then chose one or more of the following categories: White, Black, Asian, Native American, or other. We categorized students as Hispanic, (non-Hispanic) White, (non-Hispanic) Black, Asian and other. The group other includes Native Americans, adolescents who did not choose any race and those who reported more than one race. The number of respondents in each of these subgroups is too small to be analyzed separately but combined the group is too heterogeneous to allow a systematic interpretation of the meaning of race/ethnicity for these individuals. Therefore, the other category is not presented.

Control variables were selected based on theory and empirical reports. Adolescent characteristics were sex and age (in years), which are expected to be associated both with body weight and with friendship patterns. We included the number of years the student has attended the school, as recently arrived students have had fewer opportunities to make friends in school. Family background was measured using parents' education (completed years of school) and whether the family received food stamps (yes or no). School characteristics were: number of students, public or private school, geographical region (West, Midwest, South, Northeast), and urbanicity (urban vs rural or suburban). The proportion of schoolmates of the same race/ethnic group as the child was included because the level of acceptance of body weight at a school and the implications of body weight for social integration may differ with the racial and ethnic composition of the school.

Models

The unequal probability cluster sample design of Add Health requires the use of robust standard errors at the school level. We weighted and adjusted the analytical models for differences in selection probabilities and response rates. Thus, sample totals serve as population estimates.[30] We first examined the completeness and distribution of each variable and looked for problems of colinearity among the covariates. We estimated social integration patterns in friendships by race, ethnicity and weight and calculated *t* tests to explore the distributions. Models were stratified by sex and included interactions between race/ethnicity and obesity.

The first model, using logistic regression, addressed whether obese

Table 1. Indicators of social integration by race/ethnicity and obesity

	White		Black		Hispanic		Asian	
	Not Obese	Obese	Not Obese	Obese	Not Obese	Obese	Not Obese	Obese
No friends reported (proportion)	.08	.07	.18[a]	.13[b]	.19[a]	.19[a]	.12	.13
Number of friends reported (mean)	4.13	4.09	3.50[a]	3.62[a]	3.38[a]	3.43[a]	3.64[a]	3.68[a]
Friendship nominations received (mean)	5.31	3.36[a,d]	4.34[a]	3.19[a,d]	3.83[a]	3.09[a,c]	4.08[a]	2.51[a,d]
Best friend reciprocated (proportion)	.58	.45[a,d]	.39[a]	.47	.39[a]	.30[a]	.48[a]	.37[a]
n	5,397	474	1,968	263	1,794	208	574	45

Table presents weighted means and proportions.
[a] significant at 1% from White not obese adolescents.
[b] significant at 10%.
[c] significant at 5%.
[d] significant at 1% compared with non-obese of same race/ethnicity.

adolescents were more likely to report having no friends. The second model predicted the number of friends reported by obese and non-obese adolescents using linear regression. Third, we used linear regression to examine the number of friend nominations from other students in the school. Finally, using logistic regression, we examined whether the best school friendship was reciprocated, analyzed for those who reported having at least one friend in school.

RESULTS

Table 1 shows descriptive characteristics by weight category and race/ethnicity comparing obese and non-obese adolescents for each measure of social integration. Between 8 and 19% of adolescents reported having no friends, with the fewest friendless adolescents being non-obese White adolescents and the most friendless adolescents being Hispanics. Obese adolescents did not report being friendless significantly more often, and in fact there were fewer obese than non-obese Black adolescents reporting having no friends. Adolescents reported on average between 3.38 and 4.13 friends, again with the most friends reported by non-obese White youth and the fewest by non-obese Hispanic adolescents. Only among White youth did obese adolescents report significantly fewer friends than those who were not obese. In schoolmates' reports, there were more differences by obesity status than in self-reports. Adolescents were selected as friends by between 2.51 and 5.31 schoomates, with the most nominations received by non-obese White youth and the fewest by obese Asians. Across racial and ethnic groups, obese adolescents were selected as friends by fewer schoolmates. Between 30 and 58% of adolescents had at least one of their five same-sex friendships reciprocated, with the highest reciprocation by non-obese Whites and the lowest reciprocation by obese Hispanics. Among Blacks, obese adolescents had their best friendships reciprocated at least as often as non-obese adolescents.

It is important to note that the number of friends shown in Table 1 refers to total number of self-reported friends, while the count of friendship nominations is based only on responses from among schoolmates. It is interesting to note that across racial and ethnic groups, non-obese adolescents reported fewer friends than they received nominations, while obese adolescents reported more friends than the number of nominations received. Non-obese White youth under-count their friendships most, by almost 1.2 friends. Among obese adolescents, the greatest difference between self-reported number of friends and friendship nominantions from schoolmates was among Asian adolescents, who reported having about 1 more friend than nominations received from schoolmates; the smallest difference was among Hispanic adolescents, whose self-reports and schoolmate nominations were most similar. When adolescents reported more friends than the number of nominations they received, there are two possible interpretations: it may be that these individuals overestimated the number of people they could count on as friends, or that they have more of their friends outside of school.

After controlling for other characteristics, obese adolescents were not more likely than non-obese adolescents to report that they had no friends. Compared with White adolescents, Black and Hispanic adolescents students were significantly more likely to report being friendless: more than twice as likely for Black adolescents (OR=2.16, $P \leq .01$; data not shown) and about two thirds more likely for Hispanic adolescents (OR=1.79, $P \leq .01$). In multivariate models with race-by-obesity interactions, shown in Tables 2 and 3, terms indicate the additional estimated effect of being a non-White obese adolescent, and is additive to the estimated effects of obesity and race. Models 1 through 3 in Table 2 (left panel) show that there were no significant interactions between obesity and race/ethnicity, indicating that, after accounting for the negative implications of race and ethnicity for friendships there are no additional consequences of being both obese and non-White.

Table 2. Weight status and self-reported social integration, by race/ethnicity and sex

	Reports No Friends Logistic Regression Estimates			Number of Friends Linear Regression Estimates		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables	All Students	Girls	Boys	All Students	Girls	Boys
White, not obese (ref)	–	–	–	–	–	–
Obese	−.26	−.62	−.19	.03	.04	.02
	(.20)	(.42)	(.22)	(.08)	(.10)	(.11)
Black	.81[c]	.85[c]	.81[c]	−.55[c]	−.43[c]	−.71[c]
	(.15)	(.23)	(.17)	(.10)	(.10)	(.13)
Hispanic	.57[c]	.74[b]	.48[b]	−.46[c]	−.48[c]	−.44[c]
	(.22)	(.37)	(.20)	(.12)	(.16)	(.14)
Asian	.17	.76[a]	−.14	−.32[a]	−.46[b]	−.23
	(.34)	(.44)	(.40)	(.18)	(.20)	(.25)
Black, obese	−.05	.07	.05	.03	−.02	.03
	(.31)	(.57)	(.41)	(.17)	(.21)	(.33)
Hispanic, obese	.26	1.25	−.14	.03	−.15	.16
	(.44)	(.76)	(.53)	(.29)	(.49)	(.35)
Asian, obese	−.15	1.10	−.22	.35	.31	.34
	(.52)	(1.30)	(.71)	(.23)	(.97)	(.28)
Constant	−4.38[c]	−5.52[c]	−4.33[c]	5.14[c]	5.42[c]	5.32[c]
	(.59)	(.76)	(.72)	(.31)	(.36)	(.47)
n	11,566	5,895	5,671	11,566	5,895	5,671

Standard errors in parentheses.

Note: All models include controls for: other race, sex, parental education, food stamp eligibility, years the respondent has attended current school, number of students in school, proportion of students of the same race/ethnicity in school, public/private school, region, and urbanicity.

[a] significant at 10%.

[b] significant at 5%;

[c] significant at 1%.

In terms of number of friends reported, obese adolescents reported as many friends as non-obese adolescents (.06, NS; data not shown) yet, minority adolescents reported significantly fewer friends than White youth (for Blacks, −.53, $P \leq .01$; and for Hispanics, −.45, $P \leq .01$; for Asians, −.27, NS). Interactions (Models 4 through 6 in Table 2) again indicate no additional consequences to being both non-White and obese. In sum, there are no substantial differences between obese and non-obese adolescents of all races and ethnicities in social integration by self-reported measures.

As with self-reported friendship measures, Black (−.61, $P \leq .05$; table not shown) and Hispanic (−.46, $P \leq 0.10$) youth were selected by fewer schoolmates as friends than White youth and obese adolescents were selected by significantly fewer friends than their non-obese schoolmates(−1.47, $P \leq .01$). For obese White youth, this amounts to almost 2 fewer schoolmates selecting them as friends(−1.87, $P \leq .01$). Models with race/ethnicity-by-obesity interactions based on schoolmates' reports are shown in Table 3. In Models 1 through 3 (left panel), obese Black adolescents, especially girls, experienced significantly smaller consequences of obesity in the number of schoolmates who selected them as friends compared with obese White youth. Similar patterns emerge with our best friend reciprocation measure.

Compared to non-obese Whites, obese Whites were about half as likely to have their friendship reciprocated (OR=.58, $P \leq .01$; data not shown). Among non-obese youth, Black (OR=.65, $P \leq .01$) and Hispanic (OR=.65, $P \leq .01$) adolescents had lower odds of having their friendship reciprocated compared with their White peers. This lower likelihood of reciprocation is worrisome considering minority students already reported fewer friendships (Table 2), uncovering a double disadvantage among minority youth; not only did they report fewer friends, but the school friends whom they had identified were also less likely to reciprocate their friendships. The interaction models shown in Table 3 (Models 4 through 6) show that Black and Hispanic adolescents, especially Black girls and Hispanic boys, experienced significantly lower consequences of obesity on friendship reciprocation than did White youth. In fact, obese Blacks were more likely to have friendships reciprocated than non-obese Black adolescents and had similar rates of reciprocated friendships to non-obese White peers.

DISCUSSION

Previous research examining friendship among adolescents demonstrated that weight is an important factor in social integration and recommended that the significance of race/ethnicity also be considered,[4] as minority youth

Table 3. Weight status and schoolmate-reported social integration, by race/ethnicity and sex

	Number of Friends Linear Regression Estimates			Best Friend Reciprocated Friendship Logistic Regression Estimates		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Variables	All Students	Girls	Boys	All Students	Girls	Boys
White, not obese (ref.)	–	–	–	–	–	–
Obese	−.54[c]	−.45[b]	−.60[c]	−1.86[c]	−2.02[c]	−1.72[c]
	(.12)	(.20)	(.18)	(.19)	(.30)	(.24)
Black	−.44[b]	−.50[c]	−.39[b]	−.56[b]	−.74[b]	−.37
	(.10)	(.12)	(.16)	(.28)	(.31)	(.33)
Hispanic	−.29[b]	−.46[c]	−.09	−.37	−.56	−.19
	(.13)	(.17)	(.18)	(.29)	(.36)	(.38)
Asian	−.07	−.54[b]	.38	−.21	−.58	.18
	(.20)	(.26)	(.23)	(.37)	(.42)	(.50)
Black, obese	.71[c]	.87[c]	.39	.59[b]	1.10[c]	.02
	(.26)	(.32)	(.37)	(.26)	(.38)	(.42)
Hispanic, obese	.06	.04	.02	.98[b]	.93	.94[a]
	(.33)	(.42)	(.45)	(.43)	(.62)	(.53)
Asian, obese	.22	.33	.03	.70	−.28	.61
	(.56)	(.54)	(.71)	(.56)	(.69)	(.64)
Constant	.49	.64	.76	3.50[c]	5.94[c]	1.77
	(.48)	(.66)	(.57)	(.93)	(1.01)	(1.14)
n	10,088	5,384	4,704	11,566	5,895	5,671

All models include controls for: other race, sex, parental education, foodstamp eligibility, years the respondent has attended current school, number of students in school, proportion of students of the same race/ethnicity in school, public/private school, region, and urbanicity.

Standard errors in parentheses.

[a] significant at 10%.

[b] significant at 5%.

[c] significant at 1%.

We found that obese adolescents face significant disadvantage in terms of social integration in high school, but that it would be misleading to assume that these social implications are similar across racial and ethnic groups.

are disadvantaged in terms of number of friends.[3] Our study shows that race/ethnicity is indeed key in understanding the social implications of obesity. We found that obese adolescents face significant disadvantage in terms of social integration in high school, but that it would be misleading to assume that these social implications are similar across racial and ethnic groups. Our results indicate that there are no racial/ethnic differences in self-reported friendships associated with obesity. In terms of schoolmate-reported friendships, we found that there are fewer social disadvantages of obesity for some minority youth than for White youth. Black adolescents, especially girls, experienced less exclusion associated with obesity than did their White peers in terms of number of schoolmates selecting them as friends and number of school friends reciprocating their friendships. Black and Hispanic adolescents, especially Black girls and Hispanic boys, were not less likely to have their best school friendships reciprocated than non-obese Black adolescents and were significantly more likely to have their friendships reciprocated than obese White youth. Thus, some obese minority youth seem to suffer less exclusion from schoolmates and less rejection of their friendships than do obese White youth.

While it is true that obese adolescents are less socially integrated, there are differences across racial and ethnic groups that need to be explained further. The fact that obese adolescents reported having more friends than their schoolmates' reports suggest could be in part an indication that they tend to have more of their friends outside of school. Among Hispanic adolescents, best friends are often family or close like family. Familism, or the emphasis on family commitments,[31] may be one reason for the differences in friendship. Cousins or other family members may provide social relationships. For health research, it will be important to consider whether family compared with non-family friends and whether school compared with neighborhood social contacts have different types of influence on health behavior.[32]

Another important consideration is cultural acceptance of body size. There may be cultural differences in how

youth evaluate one another and themselves when it comes to weight. Our findings that for Black adolescents, obesity does not have the same negative social consequences are in line with findings that the African American culture may be more accepting of larger body sizes.[9,10]A related issue is that the social importance of obesity may differ among schools, with students in predominantly White schools aspiring to the ''thin ideal'' more than those in schools with larger Hispanic or African American populations. However, our results indicate that the school's racial makeup does not explain differences in friendships associated with obesity, race, and ethnicity.

While offering a new perspective on the social implications of obesity and providing a detailed sex and race/ethnic-specific analysis, our study has some limitations. One is the reliance on cross-sectional data. However, the cross-sectional approach allowed us the sample size to stratify analyses by sex and race/ethnicity, which would not have been possible with the smaller longitudinal samples of Add Health or other datasets. Additionally, the sample was not large enough to separately analyze all available racial and ethnic groups. Even the sample of Asians may be insufficient to detect significant differences. Further, the Asian and Hispanic categories, while consistent with those currently used in the literature, are not homogenous groups. There is evidence that Filipino and Chinese adolescents have a higher prevalence of obesity than Korean, Japanese, and Southeast Asian adolescents, while Central American adolescents have a lower prevalence of obesity than Mexican, Puerto Rican and Cuban Adolescents in the United States.[19] Implications, therefore, should be applied with caution for specific ethnic groups.[19] This limitation could be addressed by future research in studies with large samples of Hispanic adolescents and Asian adolescents. Finally, we are relying on self-reported height and weight, which may be systematically biased. Still, such systematic bias generally entails that individuals report themselves as thinner than they are,[33] meaning that we are recording a lower bound of the importance of body weight for friendships.

Our research sheds light on the implications of obesity for social integration in the diverse adolescent population of the United States. Our findings highlight that it is important to understand the complexities of social behavior associated with the health and developmental challenges encountered by youth, identifying the most vulnerable youth, as well as the appropriate methods for health interventions in diverse populations.

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