

**Weight and Friendships in Adolescence:
The Additional Complexity of Race, Ethnicity and Gender**

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Abstract

Childhood obesity is associated with poorer health, including diabetes and heart disease, and with psycho-social problems, such as exclusion and victimization. Because peers and close friends are important for social and psychological development, we examine whether weight is a criterion in friendship formation among adolescents and whether the effects of weight on friendship differ by race/ethnicity and gender. Using Add Health, we consider several measures of friendship based on both the respondent's own reports and those of his/her schoolmates, and find a mismatch between own and peer reports. Based on self reports, obese adolescents have at least as many friends as other adolescents. However, based on schoolmates' reports, we find that obese adolescents are less likely to be selected as friends and are less likely to have their friendships reciprocated. The relationship between weight and friendship varies by race/ethnicity and gender, with obesity increasing friendship among some adolescents.

Introduction

Obesity early in life is associated with poorer physical health (Dietz 1998; Division of Nutrition and Physical Activity National Center for Chronic Disease Prevention and Health Promotion 2006a; Must and Anderson 2003; Serdula, Ivery, Coates, Freedman, Williamson, and Byers 1993) and psycho-social problems (Friedlander, Larkin, Rosen, Palermo, and Redline 2003; Storch, Milsom, DeBraganza, Lewin, Geffken, and Silverstein 2007). Previous studies have explored some social aspects of overweight, documenting the victimization and exclusion of overweight children (Bell and Morgan 2000; Friedlander et al. 2003; Musher-Eizenman, Holub, Miller, Goldstein, and Edwards-Leeper 2004; Pearce, Boergers, and Prinstein 2002; Storch et al. 2007) and the influence of peers in weight control behaviors (Eisenberg, Neumark-Sztainer, Story, and Perry 2005; Mackey and La Greca 2007). This paper explores a more foundational aspect of the social implications of obesity during adolescence that has not been sufficiently examined: the relevance of weight for friendship formation. Because weight is a salient aspect of identity and of individuals' perceptions of each other, we expect weight to be an important determining factor in the formation and subsequent development of friendships. This study demonstrates some of the significant ways in which adolescents' body proportions and friendships are intertwined.

Adolescence is a time when body proportions, self-image, physical activity, and food consumption patterns are all changing. It is also a time when the main loci of influence shift from parents and teachers to friends and peers (Corsaro and Eder 1990; Giordano 2003; Hamm and Faircloth 2005). Peer groups, and especially the closest friends, become important source of support and influence for children's well-being. Though the need to

understand the social influences that affect weight has been recognized (Gable and Lutz 2000), only a few studies have considered the associations between peers and weight during adolescence (Crosnoe, Frank, and Mueller 2008; Haines and Neumark-Sztainer 2006; Kohl III and Hobbs 1998; Strauss and Pollack 2003; Sweeting, Wright, and Minnis 2005), and most have focused on the effects of victimization and isolation on overweight adolescents.

We use a nationally representative longitudinal survey of adolescents, the National Longitudinal Study of Adolescent Health (henceforth Add Health), which includes information on the weight and friendships over 15,000 students. The study design allows us to link respondents' records with those of their school friends. This is an advantage over most previous studies, since it allows us to consider both the respondents' assumptions and claims about their friends and their friends' direct reports.

Background

The prevalence of childhood obesity in the U.S. has increased over the past several decades (Division of Nutrition and Physical Activity National Center for Chronic Disease Prevention and Health Promotion 2006b; Ogden, Carroll, and Flegal 2008). Among adolescents (12-19), 17.6% had high BMIs for their age in 2003-2006 (Ogden, Carroll, and Flegal 2008). High BMIs were more prevalent among non-Hispanic Black (22.9%) and Mexican American (21.1%) adolescents than among non-Hispanic Whites (16.0%). A recently published study demonstrates that the prevalence is greatest among non-Hispanic Black girls (27.7%) and lowest among non-Hispanic White girls (14.5%) (Ogden, Carroll, and Flegal 2008).

Obesity in youth is of concern because it is associated with poorer physical and mental health and social well-being (Division of Nutrition and Physical Activity National Center for Chronic Disease Prevention and Health Promotion 2006a; Institute of Medicine 2005). Once established, obesity is difficult to reverse (Muller, Danielzik, and Pust 2005), thus, obese children are much more likely to become obese adults (Bouchard 1997; Serdula et al. 1993). Obesity and weight gain during the early years may also be associated with mortality and morbidity in adulthood (Dietz 1998; Must and Strauss 1999). Obese children face social problems and are more likely to have psychological problems, as discussed below. Overweight adolescents have lower educational achievement (Crosnoe and Muller 2004; Lissau-Lund-Sorensen and Sorensen 1992), and adults who were obese adolescents tend to report lower socioeconomic status (Dietz 1998).

Psycho-social implications of weight in childhood

The negative social and psychological ramifications of adolescent obesity may be as damaging as the physical health consequences (Pearce, Boergers, and Prinstein 2002). Obese children face social problems such as teasing (Hayden-Wade, Stein, Ghaderi, Saelens, Zabinski, and Wilfley 2005), systematic discrimination (Dietz 1998), mistreatment (Crosnoe and Muller 2004), exclusion and chronic victimization, even more than children with other stigmatized attributes (Lissau-Lund-Sorensen and Sorensen 1992; Pearce, Boergers, and Prinstein 2002; Storch et al. 2007; Sweeting, Wright, and Minnis 2005). Children have negative attitudes towards obese children (Cramer and Steinwert 1998), and these negative feelings are held even by children who are

themselves obese (Lerner and Korn 1972; Staffieri 1967). Weight is an important marker by which adolescents assess themselves (Haines and Neumark-Sztainer 2006), and, as children enter adolescence, their self-image is increasingly shaped by cultural factors and peers and less by parents. Obese children are more likely to have psychological problems such as depression and low self-esteem (Friedlander et al. 2003; Ge, Elder, Regnerus, and Cox 2001; Strauss 2000), and to express body dissatisfaction (Sands and Wardle 2003; Thompson, Obarzanek, Franko, Barton, Morisson, Bro, Daniels, and Striegel-Moore 2007). They are more likely to be held back, to consider themselves poor students, to expect to quit school and to report suicide attempts (Falkner, Neumark-Sztainer, Story, Jeffery, Beuhring, and Resnick 2001).

Children who *are not accepted* by their peers or who *believe that they are not accepted* are at increased risk of adjustment problems and depression in early adulthood (Kistner and Balthazor 1999), so that obese adolescents suffer from the consequences of not being accepted whether or not they actually are (Musher-Eizenman et al. 2004). Obese children can experience weight-related criticism during physical activity, which discourages them from participating (Faith, Leone, Ayers, Heo, and Pietrobelli 2002; Hayden-Wade et al. 2005). Anticipating that they may be ridiculed and fearing victimization, they avoid physical activities and activities that are not supervised, making it even more difficult for them to lose weight (Storch et al. 2007). In sum, many of the important consequences of adolescent obesity are the negative implications for socialization and mental well-being, so that obesity affects the physical health and social and psychological well-being of adolescents with consequences into adulthood (Crosnoe and Muller 2004).

The importance of school friends during adolescence

During the adolescent years, friends become youths' primary locus of reference (Adler and Adler 1998; Erwin 1998). Researchers agree that friendships are a key part of the social, cognitive, and emotional development of youths (Nangle and Erdley 2001; Newcomb and Bagwell 1995). Friends provide social support and a context in which youths learn social skills. Peers, and especially close friends, play a major role in defining which behaviors, values, and attitudes are embraced and which ones are rejected (Berndt 1999; Carbonaro 1998; Crosnoe 2000; Crosnoe, Cavanagh, and Elder 2003). Friendships in adolescence have been shown to affect timing of first sexual intercourse, drug use, delinquency, and educational attainment (Antonio 2004; Berndt 1999; Berndt 2002; Billy and Udry 1985; Crosnoe 2002; Crosnoe, Cavanagh, and Elder 2003; Giordano, Cernkovich, and Pugh 1986; Kandel 1978; Kao and Vaquera 2006; Vaquera and Kao 2008).

As many of the interactions with peers and friends occur at school, *school-based friendships* capture much of adolescents' social universe (Moody 2001). The school is a key social context in which youths spend significant periods of time together (Crosnoe and Muller 2004; Crosnoe and Lopez-Gonzalez 2005) and in which many social behaviors, including those affecting weight, such as meals and physical activity, take place. Additionally, learning about school friendships is important because schools are an ideal setting for health behavior interventions (Plotnikoff, Bercovitz, Rhodes, Loucaides, and Karunamuni 2007; Rhodes and Ludwig 2007), and "modification of school

environment can affect the activity levels of children and adolescents substantially” (Kohl III and Hobbs 1998).

Obesity and friendship formation

Studying the effects of obesity on peer relationships during adolescence is important for several reasons: adolescents are reliant on their peers for social support and self-esteem; pubertal development causes changes in body proportions that may be especially important for peer image; and the experiences of developing relationships in adolescence may guide the formation of relationships in adulthood (Pearce, Boergers, and Prinstein 2002). Body size has been linked to inconsistencies between the perceived friendships of boys and girls and their social acceptance by schoolmates. Larger adolescents do not tend to perceive themselves as being socially isolated compared to their thinner counterparts, but appear to be more isolated based on their schoolmates’ reports. These inconsistencies are especially dire for girls (Crosnoe, Frank, and Strassmann 2008).

A few previous studies have suggested that weight in childhood and adolescence is important for the development and characteristics of friendships. There is some evidence that adolescent friends resemble each other in body size (Duncan, Boisjoly, and Harris 2001; Paxton, Schutz, Wertheim, and Muir 1999). Obese children are less likely to be selected as friends than normal-weight children (Bell and Morgan 2000; Musher-Eizenman et al. 2004; Sigelman 1991; Young and Avdzej 1979), report spending less time with friends (Falkner et al. 2001), and are more likely to be rejected by their classmates than other children (Mahoney, Lord, and Carryl 2005). Images of chubby children were less likely to be selected as playmates than thin or average figures, and

were almost never selected as potential best friend. Chubby figures were described with more negative adjectives, such as mean, stupid, sloppy, ugly, loud, and friendless (Musher-Eizenman et al. 2004). Obese youths also have more difficulties developing romantic relationships, which may negatively influence their ability to develop romantic relationships in adulthood (Pearce, Boergers, and Prinstein 2002). Obese girls reported fewer dating relationships than other girls (Pearce, Boergers, and Prinstein 2002), and, when they reach adulthood, individuals who were obese adolescents are less likely to marry (Gortmaker, Must, Perrin, Sobol, and Dietz 1993).

Race, ethnicity, gender and weight status

The relationships between friendship and weight may be different across demographic groups. Previous research has shown that boys and girls are different in terms of weight, peer influences, and the psycho-social implications of both. There are differences in terms of body proportions among adolescents by gender and race/ethnicity (Ogden, Carroll, and Flegal 2008) and minority youths may be more susceptible to peer influences (Crosnoe, Cavanagh, and Elder 2003; Giordano, Cernkovich, and DeMaris 1993). Boys are more likely to have high BMIs (Ogden, Carroll, and Flegal 2008). Still, boys are two times more active than girls, and some have argued that peer influences pressure boys more than girls to be active (Kohl III and Hobbs 1998). However, being obese may be more detrimental for girls. Girls are even less likely to rate themselves as clever and are less likely to enter college if they are obese (Crosnoe 2007; Sweeting, Wright, and Minnis 2005). Body image and weight concerns are more important for girls (Pearce, Boergers, and Prinstein 2002; Plotnikoff et al. 2007), and have far-reaching

negative consequences (Crosnoe 2007). This may in part be the result of gender-specific interactions with peers. Obese boys are more likely to be teased, punched, hit and kicked than other boys, while obese girls tend to be subject to relational victimization: peers refuse spending time with them, do not talk to them, or do not sit next to them (Pearce, Boergers, and Prinstein 2002).

Additional research supports that girls may also be more susceptible to peer influences (Plotnikoff et al. 2007) as they are unhappier than boys if they do not feel accepted by peers (Kistner and Balthazor 1999). Friends might have more influence on girls' than on boys' physical activity because there might be fewer societal influences encouraging girls to participate in physical activity than there are for boys, thus girls will only become involved if their friends do. Because girls spend less time doing physical activities, they likely spend a smaller proportion of the time spent with friends engaging in sports, which means less exposure to being ridiculed by more fit students. They may instead spend more time eating together and doing one-on-one activities. The implications of this are two-fold: first, the extent to which these activities are more physical, for example walking, jogging, or shopping, rather than inactive, like watching television or talking on the phone may be an important component of girls' overall physical activity levels. This is important especially because "physical inactivity may be a better indicator of long-term behavior" than physical activity (Young, Dean, Flett, and Wood-Steiman 2000). But it also hints at the likelihood that the paths by which boys' and girls' weight relates to their friendship relationships are different.

In addition to gender differences, weight status also differs by racial and ethnic background, with greater prevalence of obesity among blacks, Hispanics, and Native

Americans (Ebbeling, Pawlak, and Ludwig 2002; Hedley, Ogden, Johnson, Carroll, Curtin, and Flegal 2004; Ogden, Carroll, and Flegal 2008). There is evidence that health behaviors differ in adolescence by racial and ethnic group. For example, there are differences in acceptance of body weight and in eating disorders between blacks and whites (Dietz 1998). Black adolescents report both more unhealthful eating and also less dieting than whites and Hispanics (Mackey and La Greca 2007). Socioeconomic inequality is a key factor in explaining racial/ethnic disparities in obesity (French, Story, and Jeffery 2001; Hargreaves, Schlundt, and Buchowski 2002), since healthier diets are more expensive, fast food is an inexpensive and convenient alternative to healthier options, fast food establishments are disproportionately concentrated in poor, urban areas, and neighborhoods with high concentrations of Blacks and Hispanics have fewer “green spaces” such as parks and pools (Glendening, Hearne, Segal, Juliano, and Earls 2005).

Nevertheless, race/ethnicity remains associated with excess weight even after controlling for differences in socio-economic status (Chang and Lauderdale 2005) with suggests that even though the affordability of health food options and exercise is an issue, cultural differences in body image and traditional diets are also important considerations. The influence of culture on weight status can be positive or negative. For instance, in the U.S., Asians have the lowest prevalence of obesity than any other racial group (Glendening et al. 2005). Studies show that traditional Asian diets are often rich in vegetables and low in saturated fat (Lauderdale and Rathouz 2000). However, this health advantage erodes with increases in acculturation and the adoption of mainstream American eating behaviors and food preferences (Popkin and Udry 1998; Salant and Lauderdale 2003). On the other hand, the traditional African American cuisine tends to

be low in fiber and high in sodium and cholesterol.

In addition to body image and diet, research also shows racial and ethnic differences variations in the formation and characteristics of friends. A recent study argues that Hispanic and black adolescents maintain friendships for a longer time, and that Asian American adolescents are the least likely to form close friendships because they are discouraged by their parents from spending time with school friends outside school (Way, Gingold, Rotenberg, and Kuriakose 2005). Black and Hispanic youths are less likely to have their friendships reciprocated compared to whites (Giordano, Cernkovich, and DeMaris 1993) and black youths tend to report lower levels of intimacy within friendships relative to white youths (Way, Gingold, Rotenberg, and Kuriakose 2005).

Despite the above evidence that shows variation in obesity and friendship by gender and race and ethnicity, to date, there are no studies that directly examine the relationship between body proportions and friendship formation in the context of both gender and race/ethnicity. In this study, we test whether race/ethnicity, gender, and body proportions interact with each other to affect friendship patterns differently. As noted above, weight status seems to be more important for girls than for boys. Because of the socio-economic and cultural differences among the racial and ethnic groups, it is reasonable to expect that race/ethnicity may add yet another set of social implications that affect friendship formation.

Data and Methods

We use the National Longitudinal Study of Adolescent Health (Add Health), a school-based longitudinal study of the health-related behaviors of adolescents and their

outcomes in young adulthood. It is representative of the U.S. population enrolled in secondary school in 1995. The first data collection was conducted in schools in 1994-95 (In-School questionnaire) and included all students in the selected schools. Interviews were conducted with 90,000 students (Harris 2003). The In-School questionnaire was followed by an In-Home wave in 1995, in which 200 students were recruited from each school pair (High School and Middle School), resulting in a self-weighting sample of 20,745 adolescents in grades 7 through 12 (Harris 2003). A second In-Home wave was carried out in 1996, a third wave in 2001-02, and a fourth wave is being fielded in 2008. Separate interviews with parents, siblings and partners were also conducted for the respondents of the original In-Home instrument. Parents were asked about home conditions, including their socioeconomic and relationship situation.

For the current study we use respondents who participated both in the In-School and the In-Home Wave I surveys, resulting in a sample of 15,355. We must use data from the sample that was included in both instruments because information on friends was collected in the In-School instrument, while information on health, including weight and height, was collected in the In-Home instrument.

Measuring friendships

To identify friendships, we use reports from the respondents themselves about their friendships, as well as from all other students in their school. Respondents were asked to nominate up to five male and five female friends from the school roster (provided by the school including the names of all the students enrolled in school) or from among their out-of-school friends. For this paper we restrict our definition of friend to same-sex friends because Add Health instructions asked respondents to include romantic

relationships. Less than 5% of cross-gender friendships non-romantic (Hartup and Laursen 1993), these romantic relationships may relate in different ways to body proportions.

Our empirical analyses proceed in the following way: we begin by looking at self-reports of *friendship*. To determine whether the student is friendless, we identify students who did not report any same-sex best friend out of the five possible. Second, we consider total number of friends as reported by the respondent using the count of total self-reported friends of the same sex. Students could report up to 5 same-sex best friends. Our third approach is to consider whether friendships are reciprocated. For this, we can only use friendships with individuals who are at the same school, because only for these can we tap into both the respondent's reports and those of his or her schoolmates. Thus, we take the respondent's report of his or her five same-sex friends and link it to the friendship reports of the five individuals he or she named.¹ If the schoolmate also reported the respondent among his or her top five friends, then we consider the friendship to be reciprocated.² Our final approach examines the number of individuals at school who report that the respondent is one of their five friends. This is based on responses from all

¹ The current study is limited in the assumptions we are able to make about friendships. Despite the fact that over 80% of adolescents befriend others of the same race as themselves (own calculations), these friendship patterns differ by race and ethnicity. Research on interracial friendship, dating, and marriage has demonstrated that these are different in several characteristics, such as their closeness, reciprocity, and levels of stress (eg. Kao, Grace and Kara Joyner. 2004. "Do Race and Ethnicity Matter among Friends? Activities among Interracial, Interethnic, and Intraethnic Adolescent Friends." *The Sociological Quarterly* 45:557-573.; Harris, T.M. and P.J. Kalbfleisch. 2000. "Interracial Dating: The Implications of Race for Initiating a Romantic Relationship." *The Howard Journal of Communications* 11:49-64.) Examining the implications of homophily/heterophily in body weight goes beyond the scope of the current study and has partially been addressed by a recent article (Crosnoe, Robert , Kenneth Frank, and Anna Strassmann Mueller. 2008. "Gender, Body Size, and Social Relations in American High Schools." *Social Forces* 86:1189-1216.).

² Due to Add Health's design we can only identify reciprocity for those adolescents who nominated friends in schools that also responded the questionnaire. Different measures of reciprocity such as by the first best friend, or any friend lead to similar results. Tables available upon request.

the students who also answered the In-School questionnaire, identifying those who named the respondent among their top five same-sex friends.

Our two last approaches represent an important step that most studies have not had the data to address, relying instead only on self-reports of friendships. Yet it could be that obese children are either less likely to have their friendships reciprocated, or, conversely, to *believe* that they have fewer friends than they actually do because of low self esteem. Both children's perceptions of their social standing and their actual social standing are important for their psychological well-being and likely in turn for their health behaviors.

Measuring obesity in children

Obesity in children is difficult to identify because increases in weight and changes in body proportions are part of growth and maturation. What really matters for child health is not weight but body fat, or adiposity. In fact, the most effective intervention programs in children decrease adiposity without decreasing weight (American Dietetic Association 2006). Growth charts and BMI measures are not ideal measures of childhood adiposity, but are acceptable indicators (American Dietetic Association 2006) and are more feasible in large-scale studies than are more accurate measures (Must, Dallal, and Dietz 1991). When combined with age and sex, BMI has a close relationship to body fatness and can broadly indicate its level at a correlation in children between 0.4 and 0.9 (Gallagher, Visser, Sepulveda, Pierson, Harris, and Heymsfield 1996; Johnson-Taylor and Everhart 2006). Because BMI varies by age and sex in childhood, z -cores or percentiles are generally used (Johnson-Taylor and Everhart 2006). In Add Health, adolescent-reported weight and height were recorded in the In-Home questionnaire and body mass indexes can be calculated as $\text{weight (pounds)/height (inches)}^2 \times 703$.

We used the World Health Organization's age and sex-specific growth reference, which is based on data from the 1977 National Center for Health Statistics, to create z-scores of BMI for age and sex, with adolescents more than 2 standard deviations above the reference mean being considered obese (de Onis, Onyango, Borghi, Siyam, Nishida, and Siekmann 2007; World Health Organization 2007). Our measures of body proportions are BMI z-scores, odds of obesity, and BMI categories (underweight, normal weight, overweight, obese, severely obese). The results shown below are for obesity only.

Other Independent Variables

The selection of variables for inclusion in the proposed analyses is based on theory and empirical findings from the literature. The following measures will be included in our analytical models: *individual characteristics* are gender, adolescent's age (in years), and race/ethnicity from the students' self-reports ((non-Hispanic) White, Black, Asian and Other,³ and Hispanic).⁴ We also include the number of years the student has been in the current school. We measure *characteristics of parents and the home* environment such as parents' education (measured in years of schooling) and whether the family received food stamps (coded 1 for yes and 0 for no); and several *school characteristics* including size (number of students), whether it is a public or private school, geographical region (West, Midwest, South, Northeast), and its urban location (coded 1 if urban and 0 if rural or suburban).

Models

³ The category "Other" includes Native American students, adolescents who did not choose any race as well as those who reported more than one race.

⁴ For purposes of brevity, the remainder of the paper omits "non-Hispanic" before the racial groups, understanding that only Hispanics fall within this group.

The unequal probability cluster sample design of Add Health requires the use of robust standard errors at the school level. We weight and adjust the analytical models for differences in selection probabilities and response rates. Thus, sample totals serve as estimates of population totals (Chantala 2002; Chantala and Tabor 1999; Tourangeau and Shin 1998).

We explore how weight relates to the friendship formation of adolescents using the following general specifications:

$$y = \beta_0 + \beta_1 s_c + \beta_2 t_w + \beta_3 v_h + \beta_4 w_s [+e]$$

(1)

where s_c is a vector of child characteristics; t_w is an indicator of respondent's weight; v_h is a vector of household characteristics; and w_s is a vector of school characteristics.

The first model, using survey corrected logistic regression, will address whether obese adolescents are more likely *to be friendless*. The second will predict the *number of friends*⁵ of obese and non-obese children using survey-corrected linear regression. The next step is to consider whether the friendship is reciprocated, that is, whether the persons named by the index child as friends also named him/her as a friend in their own Add Health interviews. We used survey-corrected logistic regression with a dichotomous outcome of whether the index child was reciprocated by any of his or her self-reported school friends. Finally, we use a survey-corrected linear regression to examine the *number of nominations* from other students in school.

Results

⁵ We only report on same-sex friendships for consistency with the rest of outcomes. However, models including friends of both genders yielded similar results. Tables available upon request.

Table 1 shows descriptive characteristics by weight status, with survey weights used to make the sample nationally representative. The mean age of the study population is just over 14 years at the time of interview; almost 80% lived in urban or suburban area and almost all (over 90%) attended public schools, with the average school size being about 700 students. Comparing obese and non-obese adolescents, we find that obese adolescents are more likely to be male, non-white, be recipients of foodstamps, to live in the South and in suburban or rural areas, and to attend a public school.

[INSERT TABLE 1 HERE]

Table 2 illustrates describes the relationships between race/ethnicity, weight status, and several measures of friendship. Whites report the highest number of friends, while Hispanics report fewest friends, though the differences are not large. For all racial groups except whites, obese adolescents report having more friends than non-obese. Whites are also least likely to report being friendless, while Asians are most likely to do so. For all racial groups except Asians, obese adolescents are less likely to report that they are friendless. Based on reports about the respondents from their schoolmates, we encounter a different story. Obese adolescents of all races/ethnicities are selected as friends by fewer schoolmates and, for all races/ethnicities except blacks, obese adolescents are less likely to have their friendships reciprocated. The largest differences in popularity (i.e. reports by others in the school) between obese and non-obese youths are seen among whites. Across the board, obese adolescents of all races/ethnicities overestimate the number of friends they have compared with the nominations they receive from schoolmates, whereas non-obese adolescents of all races/ethnicities underestimate their number of friends. The greatest difference between self-reported number of friends and

friendship nominations from schoolmates are seen among obese Asian adolescents. This may also indicate that Asians have more of their friendships outside of school.

[INSERT TABLE 2 HERE]

Using survey-corrected logistic regression, Table 3 examines how obese adolescents compare to their non-obese counterparts in their likelihood of reporting that they have no friends.⁶ Model 1 shows that obese children are 20% less likely to report that they are friendless, with marginal significance. At the same time, controlling for obesity and the other characteristics, girls are half as likely to report that they are friendless. There are also racial differences in friendship patterns: compared with white adolescents, all minority youth are more likely to report being friendless: blacks and Hispanics are significantly more likely to do so (more than twice as likely and two thirds as likely, respectively). In Models 2 and 3, we see that obese boys and girls are less likely to report being friendless than non-obese adolescents, though these differences are not statistically significant. The racial differences persist, with Hispanic and Black boys and girls both being more likely than whites to report that they are friendless.

Models 4-6 show that, compared with white non-obese boys and girls, adolescents from other racial groups are more likely to report that they are friendless. However, this is largely the effect of race/ethnicity rather than obesity status, and in fact obesity status seems to in part counteract the effects of race/ethnicity. For example, black non-obese girls are twice as likely as non-obese white girls to report that they are friendless. However, obese black girls are only 40% more likely to report being friendless compared to white non-obese girls, so obese black girls are actually less likely to report being friendless relative to white girls than are black non-obese girls. The exception to this is

⁶ Odds ratios for Table 3 appear in Appendix B.

the case of Hispanic girls, for whom the interaction between race/ethnicity and obesity pulls in the opposite direction: Whereas Hispanic non-obese girls are about 85% more likely to report that they are friendless than non-obese white girls, obese Hispanic girls are three times more likely to do so.

Table 4 moves on to examine the total number of same-sex friends that the adolescents report. In Models 1-3 we see that obese boys and girls tend to report similar number of friends as thinner adolescents. At the same time, girls report almost 90% more friends than boys and non-whites report significantly fewer friends than whites. These results very closely mirror the ones reported above: minority non-obese boys and girls report fewer friends than non-obese whites, independently of their obesity status. Interestingly, among boys (Model 6), obese adolescents report relatively more friends than thinner adolescents, though still fewer than white non-obese boys. This is also the case for Asian and Other race/ethnicity obese girls (Model 5). However, among black and Hispanic girls, obese girls report even fewer friends than thinner girls, though the differences are small.

Together, Tables 3 and 4 suggest that there are no substantial differences in perceived friendship formation by weight status among children, though being obese may lower the disadvantage of some minority adolescents in terms of friendship formation compared to their white counterparts. Having considered only the respondent's self reports up to this point, we can draw conclusions based on the adolescent's own perceptions or the way in which he or she chooses to portray him or herself. To achieve a more complete understanding of their social relations, in the next steps, we also consider the reports of

the respondent's schoolmates and examine the extent to which others' reports support, parallel, or contradict those of the respondent. Indeed, interesting contrasts emerge.

Table 5 shows the likelihood that the respondent's friendships are reciprocated.⁷ That is, do those same-sex individuals whom he or she named as friends in school also report the respondent among their top five same-sex friends? In Model 1, we see that obese adolescents are 30% less likely to have their friendships reciprocated. However, Models 2 and 3 uncover that this disadvantage is only significant among obese boys, who are over 30% less likely to have their male friends also report them as friends. Following the same patterns shown above, girls are significantly more likely to have their friendships reciprocated than boys, and minority youth are less likely to have their friendships reciprocated than white adolescents, even though they reported fewer friends to begin with.

Models 4-6 in Table 5 add interactions between race/ethnicity and obesity status. Here, we see that both white obese girls and boys are about 40% less likely to have friendships reciprocated than thinner whites. Interestingly, non-obese black boys and girls are about as likely to have friendships reciprocated as obese whites relative to non-obese whites, so race/ethnicity and obesity have fairly equally negative effects on peer selection. The most striking result in this table is that obese blacks are more likely to have friendships reciprocated than thinner blacks and than obese whites (odds only 20% lower than non-obese whites). When we examine these interactions separately by gender, we find that much of this advantage of obese blacks over other blacks is experienced only by girls and not by boys. In fact, obese black girls have almost equal odds of having their friendships reciprocated as white girls (OR=0.96). We do not find similar benefits of

⁷ Appendix C shows odds ratios for estimates in Table 5.

obesity for the other racial groups. Obese Hispanics, Asians, and adolescents in the Other race category are less likely to have friendships reciprocated than non-obese individuals of the same race/ethnicity and then obese whites. For example, the effect of being Hispanic and obese entails half the odds of having friendships reciprocated compared with non-obese white girls.

Our final approach is to measure popularity, that is, to count the number of peers in the respondent's school that select the respondent among their top five same-sex friends. In Models 1-3 of Table 6, we see that obese boys and girls are selected by significantly fewer friends (an average of 1.5 friends) than their thinner schoolmates. Following the patterns observed above, again we find that girls are more popular than boys while whites are more popular than minority youth. In Models 2 and 3 we see that the negative effects of race/ethnicity on the number of peers who claim that the respondent is their friend was actually driven by the girls. As we saw above, all minority youth tend to be less popular than their white counterparts regardless of their weight status. In Models 4-6 we add interactions between race/ethnicity and obesity status. Here, we see that obese whites have almost 2 fewer friends than thinner whites. The effect of obesity among whites is especially strong for girls (Model 5). In terms of the number of friend nominations, the effects of race/ethnicity are larger than those of obesity: non-obese minority youth have between 0.4 (Asians) and 0.7 (blacks) fewer friend nominations than non-obese whites. Turning to obese adolescents, both white and minority youth are less popular than their thinner counterparts. However, we still observe an additional disadvantage for obese minority youth, who, in most cases, are even less popular than obese white children. Model 5 shows that most disadvantaged among them are obese Asian girls, while obese

black girls are similar to obese white girls, and obese Hispanic girls and obese children in the Other race category are even more popular than obese white girls. Overall, the race/ethnicity effects on popularity seem to be smaller and less significant for boys than for girls, and, for all races/ethnicities.

In conclusion, we find that obese children do not report friendlessness more often than their thinner counterparts, and they do not report having fewer friends. However, when we examine their schoolmates' reports we find that they are actually less popular and are less likely to have their friendships reciprocated than thinner children. There are also important interactions between obesity status and race/ethnicity, with the additive effects of obesity and race/ethnicity not necessarily resulting in even fewer friendships for these children. Finally, it is apparent that the effects of obesity and friendship are more dire for girls than for boys.

Discussion

Our results demonstrate that weight status is an important factor in friendship formation, though this only becomes apparent when we examine friendship accounts from peers. Interestingly, friendship self-reports suggest that obese children are no different from thinner adolescents in having no friends and they name as many friends as other children. This seemingly optimistic outlook about the lack of social implications of weight on close relationships is undermined once we examine the reports of their schoolmates. Reports from nominated friends and schoolmates make it apparent that they actually do experience exclusion, as they are selected by fewer schoolmates as friends, and even those whom they have named as friends are less likely to also reciprocate the friendship. We cannot be certain of the causes of this discrepancy, as it could result either

from actual beliefs that do not correspond with reality or from the way the respondents chose to portray themselves. That is, it could be that obese children report that they have more friendships than they actually do because they truly believe that they have more friends, or because they want to portray themselves as more popular in the survey (Fan, Miller, Park, Winward, Christensen, Grotevant, and Tai 2006). If it is the former, then the implications of exclusion for obese children's psychological wellbeing may be small, because they do not believe that they have fewer friends or that their friends do not perceive them as friends. Considering the schoolmates' reports, it could be that other children truly do not consider obese children to be their friends as much as other children. Alternatively, it could be that they truly are friends, but that adolescents are reluctant to reveal that they are friends with obese children, confirming the social stigma associated with obesity. Further examination of the ability of obese youth to activate resources from the friends who do not reciprocate them would reveal the implications of these mismatched reports of friendships.

We hypothesized above that weight status may have different implications for friendship formation among children of different racial and ethnic backgrounds. From their own reports, obese children of all races/ethnicities are as likely to have friends and have as many friends as thinner children. On the other hand, from their schoolmates' reports, obese children are generally less likely to have their friendships reciprocated and are nominated as friends by fewer schoolmates. However, while white obese children and obese children of most races/ethnicities are less likely to have their friendships reciprocated than their thinner counterparts, obese blacks seem to be more likely to have their friendships reciprocated. Unlike other non-white obese children, obese black girls

are more likely to have their friendships reciprocated than obese whites. Obese children of all races/ethnicities are less popular, but obese Hispanics and adolescents in the Other race group are more popular than obese whites.

In short, our results demonstrate that race/ethnicity is a key factor in all of the aspects of friendship formation examined. This effect of race/ethnicity tends to remain above and beyond the relevance of obesity on friendship formation. As previous studies have shown, minority youth (and especially immigrant children) tend to report having fewer friends, are less likely to have their friendships reciprocated, and are nominated by fewer schoolmates as friends compared with white children (Vaquera and Kao 2008). Previous research examining friendship reports among adolescents has recommended that the effect of race/ethnicity also be considered (Crosnoe, Frank, and Mueller 2008). While our cross-sectional approach is a shortcoming of this study, it allows us the sample size to examine friendship patterns by race/ethnicity.

A final goal of this study was to examine how effects of both weight status and race/ethnicity differ between boys and girls. Our results suggest that much of the differences in the effect of obesity status on friendship formation are greater for girls than for boys. The relationship between race/ethnicity and friendship appear to be mediated by gender. Minority adolescents are selected by fewer peers as friends, but when we look at boys and girls separately we find that the differences are significant among girls but not among boys. Interestingly, it is non-obese minority girls that experience exclusion from their peers, with no significant differences among non-obese boys.

Whereas there is an increasing amount of research that examines the health consequences of obesity on today's population, and especially the risks it poses for

today's youth and future adult population, there is far less research addressing the social impact of obesity during adolescence. With the current study, we attempt to fill some of these gaps in the social science literature. Our objective was to demonstrate the complex relation between obesity and friendship formation. Specifically, we examined differences between obese and non-obese adolescents in their likelihood of self-reporting that they are friendless and their number of friends, and, based on schoolmates' reports, in having their friendships reciprocated and in being identified by schoolmates as friends. We conclude that race/ethnicity, gender, and body proportions all interact with each other to shape the social environments experienced by adolescents.

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Table 1
Mean Estimates and Proportions, by Weight Status

	Obese		Non-Obese	
	Mean or Proportion	Standard Error	Mean or Proportion	Standard Error
<i>Individual characteristics</i>				
Female	0.50	(0.00)	0.38	(0.02)
Male	0.50	(0.00)	0.62	(0.02)
Age	14.68	(0.12)	14.49	(0.16)
Race/Ethnicity				
White	0.63	(0.03)	0.58	(0.03)
Black	0.12	(0.02)	0.15	(0.02)
Hispanic	0.10	(0.01)	0.12	(0.02)
Asian	0.03	(0.01)	0.01	(0.01)
Other	0.12	(0.02)	0.14	(0.02)
Years in school	2.76	(0.08)	2.66	(0.1)
<i>Parental and home environment</i>				
Parents education				
No education	0.00	(0.00)	0.00	(0.00)
Up to 8th grade	0.05	(0.02)	0.04	(0.00)
Some high school	0.13	(0.03)	0.11	(0.01)
High School	0.3	(0.04)	0.32	(0.01)
Some college	0.33	(0.05)	0.30	(0.01)
College	0.12	(0.03)	0.14	(0.01)
Graduate school	0.06	(0.02)	0.09	(0.01)
Receives foodstamps	0.12	(0.01)	0.15	(0.02)
<i>School characteristics</i>				
Urban	0.23	(0.04)	0.20	(0.04)
Rural and Suburban	0.76	(0.04)	0.80	(0.04)
Public	0.92	(0.02)	0.95	(0.02)
Private	0.08	(0.02)	0.05	(0.02)
School size	731	(51.67)	689	(54.46)
Region				
West	0.14	(0.03)	0.12	(0.02)
Midwest	0.30	(0.03)	0.29	(0.04)
South	0.39	(0.05)	0.45	(0.03)
Northeast	0.16	(0.03)	0.13	(0.01)
Observations	10338		1216	

Note: Table presents weighted means and proportions.

Table 2
 Friendship Formation by Race/Ethnicity and Obesity (means and proportions)

	White		Black		Hispanic		Asian		Other	
	Non-Obese	Obese	Non-Obese	Obese	Non-Obese	Obese	Non-Obese	Obese	Non-Obese	Obese
Is friendless (prop.)	0.08	0.08	0.18	0.13	0.19	0.19	0.12	0.13	0.15	0.11
Number of friends (mean)	4.14	4.07	3.50	3.63	3.38	3.43	3.64	3.67	3.76	3.91
Reciprocal friendship (prop.)	0.58	0.46	0.40	0.47	0.39	0.28	0.48	0.37	0.46	0.41
Popularity (mean)	5.31	3.48	4.34	3.22	3.85	2.87	4.06	2.55	4.29	3.14
N	5,340	529	1,940	286	1,764	235	571	47	1,324	201

Note: Table presents weighted means and proportions.

Table 3
Weight Status and Friendless (Logistic Regression Estimates)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Outcome= Reports not having any friends</i>	All students	Only girls	Only boys	All with race interactions	Only girls and Interactions	Only boys and Interactions
<i>Individual characteristics</i>						
Obese	-0.23+ (0.12)	-0.21 (0.22)	-0.21 (0.15)	-0.16 (0.18)	-0.66 (0.42)	-0.06 (0.19)
Female	-0.90** (0.08)			-0.90** (0.08)		
Age	0.17** (0.04)	0.16** (0.05)	0.17** (0.04)	0.17** (0.04)	0.16** (0.05)	0.17** (0.04)
White (ref.)						
Black	0.78** (0.14)	0.71** (0.22)	0.84** (0.15)	0.80** (0.15)	0.71** (0.23)	0.86** (0.16)
Hispanic	0.57** (0.21)	0.71+ (0.36)	0.50** (0.17)	0.55** (0.21)	0.62+ (0.36)	0.52** (0.18)
Asian	0.12 (0.33)	0.56 (0.43)	-0.1 (0.36)	0.14 (0.33)	0.51 (0.43)	-0.07 (0.38)
Other	0.54** (0.14)	0.65** (0.20)	0.48** (0.16)	0.58** (0.14)	0.63** (0.21)	0.54** (0.17)
Years in school	-0.05 (0.04)	-0.06 (0.06)	-0.05 (0.05)	-0.05 (0.04)	-0.06 (0.06)	-0.05 (0.05)
<i>Parental and home environment</i>						
Parents education	-0.03* (0.02)	-0.01 (0.02)	-0.05* (0.02)	-0.03* (0.02)	-0.01 (0.02)	-0.05* (0.02)
Receives foodstamps	0.19 (0.12)	-0.18 (0.22)	0.39* (0.17)	0.19 (0.12)	-0.18 (0.22)	0.39* (0.18)
<i>School characteristics</i>						
Urban	0.71** (0.20)	0.87** (0.26)	0.61** (0.18)	0.71** (0.20)	0.86** (0.26)	0.61** (0.18)
Public	0.78** (0.21)	0.67* (0.33)	0.84** (0.22)	0.78** (0.21)	0.66* (0.33)	0.84** (0.22)
School size	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
West (ref.)						
Midwest	-0.61+ (0.34)	-0.66 (0.43)	-0.55+ (0.31)	-0.61+ (0.34)	-0.66 (0.42)	-0.56+ (0.31)
South	-0.54+ (0.30)	-0.73+ (0.38)	-0.42 (0.26)	-0.55+ (0.30)	-0.73+ (0.38)	-0.43 (0.26)
Northeast	-0.49 (0.33)	-0.60 (0.39)	-0.38 (0.30)	-0.49 (0.33)	-0.61 (0.39)	-0.39 (0.30)
<i>Interactions (Models 4-6)</i>						
White*Obese (ref.)				-	--	--
Black*Obese				-0.16 (0.31)	0.30 (0.55)	-0.17 (0.39)
Hispanic*Obese				0.11 (0.40)	1.20 (0.74)	-0.19 (0.45)
Asian*Obese				-0.26 (0.52)	1.17 (1.29)	-0.37 (0.71)
Other*Obese				-0.33 (0.34)	0.37 (0.74)	-0.50 (0.41)
Constant	-4.28** (0.53)	-5.22** (0.70)	-4.35** (0.68)	-4.29** (0.54)	-5.17** (0.71)	-4.38** (0.69)
Observations	11,554	5,890	5,664	11,554	5,890	5,664

Standard errors in parentheses.

+ Significant at 10%; * significant at 5%; ** significant at 1%.

Table 4
Weight Status and Number of Friends (Linear Regression)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Outcome= Self-reported number of friends</i>	All students	Only girls	Only boys	All with interactions	Only girls and interactions	Only boys and interactions
<i>Individual characteristics</i>						
Obese	0.05 (0.10)	0.05 (0.14)	0.05 (0.12)	0.00 (0.08)	0.04 (0.09)	-0.03 (0.11)
Female	0.63** (0.06)	N/A	N/A	0.53** (0.05)	N/A	N/A
Age	-0.14** (0.02)	-0.16** (0.03)	-0.13** (0.03)	-0.12** (0.02)	-0.10** (0.02)	-0.14** (0.03)
White (ref.)						
Black	-0.59** (0.09)	-0.53** (0.13)	-0.67** (0.12)	-0.54** (0.09)	-0.38** (0.10)	-0.73** (0.13)
Hispanic	-0.46** (0.13)	-0.53* (0.21)	-0.40** (0.12)	-0.44** (0.12)	-0.42* (0.17)	-0.46** (0.12)
Asian	-0.40* (0.18)	-0.55* (0.23)	-0.29 (0.22)	-0.30+ (0.17)	-0.36+ (0.20)	-0.26 (0.23)
Other	-0.29** (0.09)	-0.37** (0.12)	-0.24* (0.12)	-0.29** (0.07)	-0.28** (0.08)	-0.31* (0.12)
Years in school	0.06** (0.02)	0.06* (0.03)	0.06* (0.03)	0.05** (0.02)	0.04* (0.02)	0.06* (0.03)
<i>Parental and home environment</i>						
Parents education	0.05** (0.01)	0.04** (0.02)	0.06** (0.02)	0.04** (0.01)	0.03* (0.01)	0.05** (0.01)
Receives foodstamps	-0.12 (0.10)	-0.01 (0.15)	-0.24 (0.15)	-0.11 (0.08)	0.03 (0.11)	-0.27+ (0.16)
<i>School characteristics</i>						
Urban	-0.41** (0.14)	-0.34* (0.17)	-0.46** (0.13)	-0.43** (0.13)	-0.34* (0.15)	-0.50** (0.14)
Public	-0.46* (0.18)	-0.23 (0.27)	-0.61** (0.14)	-0.43** (0.13)	-0.26 (0.18)	-0.55** (0.11)
School size	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
West (ref.)						
Midwest	0.41* (0.20)	0.42+ (0.24)	0.38+ (0.21)	0.34+ (0.19)	0.33 (0.21)	0.35+ (0.20)
South	0.44* (0.19)	0.50* (0.22)	0.37* (0.18)	0.38* (0.18)	0.39+ (0.20)	0.35+ (0.18)
Northeast	0.37+ (0.20)	0.41+ (0.24)	0.33 (0.20)	0.33+ (0.19)	0.32 (0.20)	0.35+ (0.20)
<i>Interactions (Models 4-6)</i>						
White*Obese (ref.)				--	--	
Black*Obese				0.07 (0.18)	-0.07 (0.20)	0.15 (0.32)
Hispanic*Obese				0.06 (0.26)	-0.19 (0.45)	0.21 (0.32)
Asian*Obese				0.37 (0.24)	0.22 (0.96)	0.41 (0.28)
Other*Obese				0.26 (0.20)	0.07 (0.27)	0.39 (0.28)
Observations	11,554	5,890	5,664	11,554	5,890	5,664
R-Squared				0.08	0.06	0.08

Standard errors in parentheses.

+ Significant at 10%; * significant at 5%; ** significant at 1%.

Table 5
Weight Status and Friendship Reciprocation (Logistic Regression Estimates)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Outcome=Schoolmates nominated as friends who also nominate respondent as friend</i>	All students	Only girls	Only boys	All with interactions	Only girls and interactions	Only boys and interactions
<i>Individual characteristics</i>						
Obese	-0.32** (0.10)	-0.22 (0.14)	-0.42** (0.12)	-0.44** (0.12)	-0.41* (0.20)	-0.48** (0.14)
Female	0.50** (0.07)	N/A	N/A	0.50** (0.07)	N/A	N/A
Age	-0.08** (0.03)	-0.04 (0.03)	-0.11** (0.03)	-0.08** (0.03)	-0.04 (0.03)	-0.11** (0.03)
White (reference)						
Black	-0.40** (0.09)	-0.37** (0.12)	-0.49** (0.14)	-0.49** (0.09)	-0.47** (0.12)	-0.54** (0.14)
Hispanic	-0.36** (0.13)	-0.41* (0.16)	-0.32* (0.16)	-0.35** (0.13)	-0.42* (0.16)	-0.28 (0.18)
Asian	-0.18 (0.18)	-0.46+ (0.24)	0.06 (0.23)	-0.2 (0.19)	-0.48+ (0.25)	0.06 (0.24)
Other	-0.28** (0.10)	-0.29* (0.11)	-0.25+ (0.15)	-0.30** (0.10)	-0.30** (0.11)	-0.30+ (0.16)
Years in school	0.12** (0.03)	0.11** (0.04)	0.13** (0.04)	0.12** (0.03)	0.11** (0.04)	0.13** (0.04)
<i>Parental and home environment</i>						
Parents education	0.03* (0.01)	0.04* (0.02)	0.03 (0.02)	0.03* (0.01)	0.04* (0.02)	0.03 (0.02)
Receives foodstamps	-0.23* (0.10)	-0.20 (0.12)	-0.27+ (0.14)	-0.22* (0.10)	-0.2 (0.12)	-0.27+ (0.14)
<i>School characteristics</i>						
Urban	-0.42** (0.19)	-0.46** (0.24)	-0.38** (0.17)	-0.42** (0.19)	-0.46** (0.24)	-0.37** (0.17)
Public	-0.19 (0.19)	-0.23 (0.24)	-0.24 (0.17)	-0.19 (0.19)	-0.23 (0.24)	-0.24 (0.17)
School size	0.00 (0.00)	0.00+ (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
West (ref.)						
Midwest	0.13 (0.13)	0.20 (0.17)	0.05 (0.16)	0.13 (0.13)	0.20 (0.17)	0.06 (0.16)
South	0.23* (0.11)	0.24+ (0.13)	0.22 (0.16)	0.23* (0.11)	0.24+ (0.13)	0.22 (0.15)
Northeast	0.29+ (0.15)	0.41* (0.16)	0.16 (0.19)	0.29+ (0.15)	0.41* (0.16)	0.17 (0.19)
<i>Interactions (Models 4-6)</i>						
White*Obese (ref.)						
Black*Obese				0.66** (0.25)	0.83* (0.32)	0.40 (0.34)
Hispanic*Obese				-0.11 (0.29)	0.07 (0.39)	-0.26 (0.42)
Asian*Obese				0.17 (0.56)	0.35 (0.52)	-0.02 (0.72)
Other*Obese				0.24 (0.32)	0.10 (0.37)	0.31 (0.42)
Observations	10,080	5,381	4,699	10,080	5,381	4,699

Standard errors in parentheses.

+ Significant at 10%; * significant at 5%; ** significant at 1%.

Table 6
Weight Status and Popularity (Linear Regression)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Outcome= Number of schoolmates who nominate respondent as friend	All students	Only girls	Only boys	All with interactions	Only girls and interactions	Only boys and interactions
<i>Individual characteristics</i>						
Obese	-1.50** (0.14)	-1.59** (0.20)	-1.42** (0.19)	-1.76** (0.19)	-1.92** (0.29)	-1.63** (0.25)
Female	0.48** (0.13)	N/A	N/A	0.48** (0.13)	N/A	N/A
Age	-0.14* (0.05)	-0.18** (0.06)	-0.09 (0.06)	-0.15** (0.05)	-0.18** (0.06)	-0.09 (0.06)
White (ref.)						
Black	-0.61* (0.24)	-0.79** (0.28)	-0.45 (0.27)	-0.68** (0.24)	-0.91** (0.27)	-0.45 (0.28)
Hispanic	-0.44+ (0.24)	-0.73* (0.34)	-0.18 (0.26)	-0.51* (0.25)	-0.82* (0.33)	-0.23 (0.28)
Asian	-0.40 (0.31)	-0.91* (0.40)	0.05 (0.39)	-0.45 (0.32)	-0.93* (0.41)	0.00 (0.42)
Other	-0.54* (0.17)	-0.64** (0.22)	-0.46* (0.22)	-0.62** (0.17)	-0.64** (0.23)	-0.63** (0.23)
Years in school	0.23** (0.06)	0.18* (0.07)	0.28** (0.06)	0.23** (0.06)	0.18* (0.07)	0.28** (0.06)
<i>Parental and home environment</i>						
Parents education	0.12** (0.02)	0.08** (0.03)	0.16** (0.03)	0.12** (0.02)	0.08** (0.03)	0.16** (0.03)
Receives foodstamps	-0.89** (0.14)	-1.01** (0.17)	-0.72** (0.21)	-0.88** (0.15)	-1.02** (0.17)	-0.72** (0.21)
<i>School characteristics</i>						
Urban	-1.12** (0.23)	-1.15** (0.27)	-1.11** (0.28)	-1.12** (0.24)	-1.15** (0.28)	-1.11** (0.28)
Public	0.21 (0.46)	-0.34 (0.58)	0.60 (0.46)	0.29 (0.46)	-0.37 (0.57)	0.58 (0.46)
School size	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
West (ref.)						
Midwest	0.99** (0.34)	1.00* (0.40)	0.97** (0.34)	1.01** (0.33)	1.04* (0.39)	1.00** (0.33)
South	1.33** (0.27)	1.32** (0.30)	1.39** (0.32)	1.33** (0.27)	1.30** (0.29)	1.41** (0.31)
Northeast	1.11** (0.31)	1.00** (0.37)	1.25** (0.39)	1.12** (0.31)	1.00** (0.36)	1.27** (0.38)
<i>Interactions (Models 4-6)</i>						
White*Obese (ref.)				-	--	--
Black*Obese				0.54* (0.25)	1.01** (0.38)	0.04 (0.42)
Hispanic*Obese				0.65+ (0.37)	1.06+ (0.60)	0.32 (0.44)
Asian*Obese				0.69 (0.57)	-0.29 (0.68)	0.63 (0.67)
Other*Obese				0.75+ (0.45)	0.09 (8.00)	1.16* (0.56)
Constant	3.79** (0.86)	6.26** (0.92)	2.00+ (1.11)	3.83** (0.86)	6.30** (0.92)	2.05+ (1.11)
Observations	11,554	5,890	5,664	11,554	5,890	5,664
R-squared	0.08	0.08	0.08	0.08	0.08	0.08

Standard errors in parentheses.

+ Significant at 10%; * significant at 5%; ** significant at 1%.