5-1-2006

Fat Teen Trouble: A Sociological Perspective of Obesity in Adolescents

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As incidence of obesity continues to rise in the United States and other industrialized nations, increased amounts of research will examine possible causes, treatments and preventative measures. It is important to examine all the possible causes of obesity in order to gain a more well-rounded understanding of what factors, both biological and environmental, influence the development of this health risk so that future preventative measures and treatment may be more effective. Biological studies have been able to isolate some of the physiological mechanisms that impact obesity, but the environmental factors are important in determining why some adolescents become obese whereas others do not. The role of the individual and his or her lifestyle are important aspects of obesity but it is also critical to examine obesity using the perspective of C. Wright Mill's "sociological imagination" framing an individual problem within the context of a larger society. Some work has been done in this area but it has not been extensive. Studying the environmental factors that influence obesity in adolescents is a significant area of study because this area is largely ignored in prior research. To address this gap, I attempt to answer the following research question: What are the social factors affecting obesity in adolescents? This is an important question because not only is obesity at a young age related to obesity later in life, there are many health risks associated with the condition. For example, obesity is associated with increased risk of developing many chronic diseases, such as diabetes and cardiovascular disease (Hill 1998). If we knew more about the factors that influence obesity, we could more effectively enact national information campaigns or political policy that would help reduce the prevalence of obesity in the United States.

This study examines the social factors related to obesity in adolescents using data from the National Longitudinal Study of Adolescent Health (Add Health). I use three different measures of obesity as dependent variables: an age-adjusted form of body mass index, an overweight / not overweight categorization based on body mass index, and an obese / not obese categorization based on the perception of the parent. The independent variables are grouped into three areas: those related to social class, those related to family situation and family support, and those related to the lifestyle of the individuals.

This paper first presents an overview of research that exists in this area. Biological research has examined the genetics of obesity, intracellular mechanisms, and the influence of these factors on obesity. Studies focusing on environmental factors have discussed obesity as a family syndrome, analyzed psychological aspects of childhood obesity, and examined the relationship between social class, race, and obesity mainly in adult samples. The next section explains the specific methodology used in this study. The data analysis section presents details of the statistical analyses used and the results which were produced by those tests. Finally, the conclusion offers a summary of the main results and suggestions for future research.

Previous Research

"Obesity is the most common nutrition disorder in the United States and other developed countries today" (Khan 1999: xiii). Researchers cite increases in food availability, portion size, and high-fat diets along with a decrease in physical activity in

the U.S. population as important factors leading to increased rates of obesity (Hill 1998). These broad cultural explanations about the rising prevalence of obesity in the U.S. do not explain how individual variation results. Recent statistics demonstrate the increased rates of obesity in the U.S. population. "In the United States between 1988 and 1994, the prevalence of obesity (body mass index $\geq$ 30 kg/m^2) was 22.5% of adults 20 years of age and older; between the 1976/1980 and the 1988/1994 National Health and Nutrition Examination Surveys, it increased 8%" (Kahn 1999: xiii). During this same period, the number of children and adolescents considered overweight doubled in the United States (Dietz 2001). Current estimates suggest that between 10 and 15% of children and adolescents are obese (Dietz 2001, Klaczynski 2004). Childhood obesity is a critical problem not only because it has been strongly correlated to adult obesity (Gerald 1994, Dietz 2001) but also because it presents its own health risks. Some risks that have been cited are:

> …decreased levels of growth hormone and prolactin; orthopedic problems such as slipped capital femoral epiphyses, Legg-Calve-Perthes disease, and genu valgum; increased rates of intertriginous dermatitis; increased risk for respiratory tract illness in obese toddlers; and increased rates of amenorrhoea and dysfunctional uterine bleeding in obese girls. Weight also contributes to risk of hypertension and hyperlipidemia in children. Cholesterol and triglyceride levels increase as weight increases in children. (Gerald 1994)

Obesity in children also has psychological consequences such as negative physical self-perceptions, lower feelings of self worth, and in some cases higher incidence of behavioral problems (Braet 1997). The many health risks associated with childhood obesity make it a critical area for study.

Childhood obesity is an interesting topic because it has a combination of biological and environmental causes. Numerous studies have been performed in both areas. One very technical area of biological study is in the area of the genetics of obesity. Research is inconclusive about the role that genetics play in a person's susceptibility to obesity. For example, according to two studies of monozygotic or identical twins that were raised either together or apart, the heritability of body mass index was found to be in the range of 40-70%, with analysts suggesting that most of this transmission effect representing cultural influences (Bouchard 1993). The genetic effect for BMI and amount of subcutaneous fat reached only 5%, and the effect was a mere 25% for percent body fat and total fat mass (Bouchard 1993). Genetics may be one factor, but it is certainly not the only factor in determining obesity. An article entitled, "Why Do People Get Fat?" by Gina Kolata argues that the signals to overeat may com from fat cells. Researchers came to this conclusion through a series of observations. First, in experiments on animals, most animals seem to have stable weights. The animals, unless their diet is forcefully altered by researchers, tend to eat just enough to maintain a fairly constant weight. When an animal or a person is left alone, their fat cells will stay constant in size (Kolata 1985b). According to this research, people who are successful in losing weight appear normal, but their internal body chemistries, specifically the size and function of their fat cells, are deranged. The researchers feel that the body, in order to maintain homeostasis, tries to maintain a certain fat cell size. This research could help to explain why even those individuals who are successful in losing weight are unable to maintain their weight loss. "The recidivism rate in obesity treatments is estimated at more than 95 percent for the morbidly obese and about 66 percent overall" (Kolata

1985b). Biological studies have also examined the intracellular mechanisms related to the concepts of hunger, satiety, and regulation of food intake (Mayer 1967). Similar to the case of genetics, these mechanisms are able to provide only part of the explanation in the variation in eating patterns among individuals. The biological approach to obesity offers important insights into the role an individual's body plays in the development of obesity, but this approach fails to consider the many external factors that also influence an individual's body. A sociological approach to obesity allows for an examination of some of these external influences that help to further explain the variation in obesity development within a population. If obesity were a purely genetic phenomenon, then such a dramatic increase in its prevalence over the course of the past several years would not have occurred.

Several prior studies have examined environmental factors that influence the incidence of childhood obesity. For example, one study surveyed undergraduate students about their views of obesity stereotypes, self-esteem, and the "thin ideal" (Klaczynski 2004). Results demonstrated the prevalence of the belief that obesity is caused by personal shortcomings (Klaczynski 2004). This focus on the individual and the individual's role in a problem is a common trend in the work that has been done on obesity. Two examples of this type of research are a study examining the psychological aspects of childhood obesity (Braet 1997) and a different study analyzing the weight concerns and weight control practices of adolescents (Adams 2000). One problem with these studies is that they are based largely on the respondents' opinions. This type of research leaves open the question of causality. Do people hold certain opinions due to

obesity or are people obese because of the opinions and behavior that manifests these opinions?

More promising research suggests three potential sets of social factors that may influence obesity: social class, family, and health- and diet-related behavior. On a broader level, studies have looked at the influence of social class on obesity. Research has demonstrated that lower social class position, is associated with higher calorie intake and a higher weight for height score in the children observed (Gerald 1993). Numerous studies have found correlations between social class and obesity rates in adults. One theory as to the influence of class on obesity is that class may limit an individual's weight maintenance ability. One study cites, "They [National Weight Control Registry] report that their success in weight maintenance is due to consumption of a low-fat diet, low total energy intake, and high levels of regular physical activity" (Hill 1998: 1373). Perhaps, class has an impact on an individual's access to low-fat foods and/ or regular physical activity. For example, if an individual is working two jobs or cannot afford high fitness club fees, it is difficult for that individual to regularly participate in physical activity. There is a lot of debate about how class should be defined but, "class, however defined, has proven to be remarkably robust in elucidating the complexities of social and historical processes and in predicting variations within and between social groups in living conditions and life chances, skill levels and material resources, relative power and privilege. Health status is one arena where the effects of class are readily evident" (Williams 1995: 350).

Hypothesis 1: Measures of social class will be negatively associated with the adolescent's age-adjusted body mass index.

There are several factors which tend to be good indicators of social class. One area is income; generally households with lower incomes are classified as being part of a lower class. Another indicator of social class is race. Especially because of the history of various races in the United States, there is still a strong correlation between race and social class, "race is one of the major bases of division in American life, and throughout US history racial disparities in health have been pervasive" (Williams 1995). Other good proxy measures of social class are education and access to health care. Individuals in higher social classes tend to have increased opportunities for quality education and health care. Both increased education and increased access to health care, specifically regular physical examinations from a medical professional would likely provide greater exposure to information about obesity that could possibly be useful in prevention.

Another environmental factor in adolescent obesity is the family situation. Research comparing interactions in families with obese children to interactions in families with non-obese children indicated an "obese pattern" of parent-child interaction involving the families' desire to keep up family appearances despite the existence of family problems (Kinston 1988). The causal relation, however, is not clear: was the obese pattern a result of having a child with obesity or was it the family environment that made it more likely that childhood obesity would develop? The author suggests that society's stigmatization of obesity may play a large part in the development of an obese

pattern, raising questions for further research. One such question is "would the children in these families [the families with obese children] have become obese if society highly prized and valued obesity?" (Kinston 1988). The family environment can have a strong impact on an individual's health. For example, research has shown that families who eat dinner together regularly consume more fruits and vegetables, fewer fried foods, and less soda than those families who do not eat dinner together (Dietz 2001).

A study examining the role of familial support in successful treatment of obesity in adults offers two opposing theories (Barbarin 1985). One possibility is that weight loss or in the context of this study, perhaps normal weight for the adolescents, may engender positive feelings about self and those feelings may result in a more favorable assessment and interaction with the family than is warranted by their actual behavior. On the other hand, those who were unsuccessful in the weight loss program or perhaps those adolescents who are overweight may look for a scapegoat to avoid self-blame which would engender more negative feelings towards the family than perhaps is warranted. Either way, it appears that family situation has an important relationship to individuals' self perception, including their perception of their weight. Because the daily lives of adolescents are connected to their families, the familial influence may be even more critical than with adults.

Hypothesis 2: Measures of a supportive, positive family situation will be negatively associated with age-adjusted body mass index.

Several factors are important when analyzing an adolescent's family situation. One measure of a family situation is the stability of the family. A stable family tends to be a more effective support system than a family with unstable conditions. Common indications of a stable family environment are whether the parents are married and whether the parents live with their children. Both characteristics are indications that both parents may be physically present in the home as a support system for the adolescent. Another aspect of the family situation is the relationship between the parent and the adolescent and the amount of time the family spends together. Often these two areas are correlated. Stronger, more positive relationships form when parents spend more time with their children.

Another important influence in the development of obesity in adolescents is the balance of dietary intake and physical activity levels. In terms of an individual's food intake, food choice is an important factor. The quality of the food brought into the home can increase caloric intake. For example, calorie-dense foods such as regular milk, sugar-sweetened beverages, high-fat foods, and fast foods are potential sources of excess caloric intake (Dietz 2001). Family food preparation practices such as the use of cream, butter, or high-fat cheeses in recipes can be another source of excess caloric intake (Dietz 2001). An individual's physical activity is also an important factor in the development of obesity. For example, time spent watching television has been associated with prevalence of obesity not only because television is a sedentary behavior but also because television advertising influences child and adolescent consumption practices (Dietz 2001). With regards to the balance of food intake and physical activity levels, no data

exist to date that links alterations in these behaviors or implementation of the division of responsibility between parents and children with a lower incidence of obesity (Dietz 2001). Another study of adults found that not only is what is being eaten considered important, but also the amount of dietary restraint, "Dietary restraint (a measure of the extent to which conscious control is exerted on food intake) provided protection against the obesity-promoting effect of the high-fat, high-energy density diet" (Hill 1998: 1372). These personal habits are another important area in obesity research. A large amount of research has focused on the effect of the actions of an individual on his or her weight. "Using various longitudinal models [in adults], a number of studies have shown that a change in diet and physical activity affect the shift in BMI" (Guo 2000). It is believed that an unhealthy diet and lack of physical activity relate to the development of obesity.

Hypothesis 3: Measures of a healthy respondent lifestyle will be negatively associated with the adolescent's age-adjusted body mass index.

There are several ways of measuring a healthy lifestyle. One indicator of intake is the eating habits of an individual. Does the person tend to eat high fat, non-nutritious food such as fried food or does the individual eat more nutritious items such as fruits and vegetables? Healthy food choices are a display of a healthy lifestyle. Another way to gauge an individual's lifestyle is whether the individual exercises on a regular basis or if he or she tends to have a sedentary lifestyle spending large amounts of time in front of the television or a computer. Generally, the measurement of an individual's lifestyle in

terms of weight must consider what the person is taking in compared to the amount of energy that the individual is expending on a regular basis.

Methodology

To study the relationship between adolescent obesity and social class, family situation, and respondent lifestyle, I used the National Longitudinal Survey of Adolescent Health (Add Health Survey). This research adds to the previous research on obesity by analyzing the effects of three main areas, social class, family situation and the respondent's lifestyle, on obesity in adolescents. A small amount of research has been performed looking at the influences of two of these areas, social class and family situation (Gerald 1993), but no research has attempted to look at all three. Whereas past research on obesity in adolescents or children has generally had the limitation of a small sample size, my final sample includes 1500 cases, 737 males and 773 females. Another limitation in past studies has been the concern that families of children with health problems were less likely to volunteer to participate in the study because of anxiety about a poor assessment of the family by physicians or other researchers (Gerald 1993). The data I used comes from a large randomly selected sample of adolescents so the sample is not as strongly influenced by families withholding participation. Whereas some past research has grouped male and female participants together into one sample, this study analyzes males and females separately which enables identification of different results for the different sexes. This research looks to expand upon prior research and create a

model that can help explain the variation in obesity among adolescents based upon measurements of social class, family situation, and respondent lifestyle.

The National Longitudinal Study of Adolescent Health (Add Health)

The National Longitudinal Study of Adolescent Health (Add Health) is a nationally representative study that explores the causes of health-related behaviors of adolescents in grades 7 through 12 and their outcomes in young adulthood. Add Health seeks to examine how social contexts (families, friends, peers, schools, neighborhoods, and communities) influence adolescents' health and risk behaviors. Initiated in 1994 with a grant from the National Institute of Child Health and Human Development (NICHD) and with co-funding from 17 other federal agencies, Add Health is the largest, most comprehensive survey of adolescents ever undertaken. Data at the individual, family, school, and community levels were collected in two waves between 1994 and 1996. In 2001 and 2002, Add Health respondents, 18 to 26 years old, were re-interviewed in a third wave to investigate the influence that adolescence has on young adulthood (Add Health website).

For this study of adolescent obesity, I use only Wave I data from the Add Health Survey, as nearly all study participants were still in adolescence. Wave I (collected between September, 1994 and December, 1995) includes three sets of data available for public use, in-school data, in-home data, and parent data. The in-school data was collected from the responses of students, grades 7 through 12, on an in-school questionnaire. There are 134 discrete schools (with some overlap between middle and

high schools) in the core study. In each school, one 45- to 60-minute class period was devoted to completing the questionnaires. The in-school questionnaire was completed by more than 90,000 adolescents. The in-home data set consists of responses to an interview of a subset of adolescents who were selected from the rosters of the sampled schools. Students in each school were stratified by grade and sex. About 17 students were randomly chosen from each stratum so that a total of approximately 200 adolescents were selected from each of the 80 pairs of schools. A total core sample of 12,105 adolescents were interviewed. All respondents were given the same interview which took from one to two hours to complete. The majority of interviews were conducted in the respondents' homes. The parent data were collected from one parent or parent-figure, preferably the resident mother, for each in-home sampled student.

The Dependent Variable

A common difficulty in studying obesity is finding an effective way to operationalize the concept. Many researchers prefer to measure the degree of overweight by skin fold thickness or water displacement. However, in studies with large samples or where respondents are interviewed in their homes these complicated techniques are not practical, and the best approximation of the degree of overweight is based on the person's weight with reference to height (Ross 1983). Since I only had access to the data set, I had limited possibilities for operationalizing obesity. One was to use body mass index (BMI) based on self reported heights and weights by the adolescents in the in-school questionnaire. BMI is a number that shows body weight adjusted for height. Although not as accurate as other forms of measuring obesity, BMI correlates with body fat and has

been found to be strongly correlated to other body fat measurement techniques as well, "Bray reports a correlation between the BMI and various anthropometric measures (such as skin fold thickness) of 0.7 to 0.8" (Averett 1996: 310). BMI is defined as an individual's weight (in kilograms) divided by his or her height (in meters) squared. Children's body fatness changes over the years as they grow. Also, girls and boys differ in their body fatness as they mature. This is why BMI for children, also referred to as BMI-for-age, is gender and age specific. The use of self-reported data to compute the BMI should be accurate, as most of the evidence to date indicates that self-reported weights and scale weights are highly correlated (Ross 1983).

Since this study analyzes obesity in adolescents, several transformations to the initial calculated BMI's were necessary in order to adjust for the gender and age of the respondents. With data for height in inches and weight in pounds provided by respondents on the survey, I was able to calculate BMI by converting to the metric measures using a conversion formula. The survey asked participants for their birth month and year and also their interview month and year. Using this data I was able to approximate the age in months of all the participants at the time of their interview. The range in the age in months of the sample I analyzed is from 137 to 240 months. After 240 months, individuals are considered on the adult scale for BMI which is not dependent on age. Using the median age of the Add Health respondents (193 months), I used the median BMI at age 193 months for males and the median BMI at age 193 months for females as a baseline. For each other age in months, I computed the ratio of the median BMI for males compared to the baseline BMI for males and multiplied the individual

calculated BMI by this ratio. I used the same process for the females.[1] The histogram for the values of the age and sex adjusted BMI had a long tail skewed towards the higher values. In order to adjust for the skewed nature of the distribution of the data, the final conversion of the dependent variable was to calculate the logarithm which produced a more uniform bell curve distribution for the values of the data.

I use the log of the age-adjusted BMI as a continuous dependent variable for my main analysis. One reason a BMI based variable was used for the main analysis is that it is more objective and more consistent with other studies of obesity. It is possible, though, that different social factors may influence people to be obese than those that influence people to be underweight. If this possibility is true, then estimates of the effects will be inaccurate. To test for this possibility, I also calculated a dichotomous overweight / not overweight variable using the age-adjusted, sex specific BMI. In accordance with the Center for Disease Control I used the 85th percentile cutoff for body mass index by age as the cutoff for being overweight. I used the overweight cutoff and not the obesity cutoff for children because using a lower cutoff increases the number of cases that are included in the overweight group.

Another option was to use adolescent obesity as reported during the parent interview where parents were asked whether their adolescent had a health problem with obesity. This variable is interesting because it is based on the parent's perception of his

[1] I tested the extent to which using the median as the basis for the age-adjusted BMI is accurate by pulling out 4 different ages (140.5, 180.5, 220.5, and 240) throughout the range I examined and calculated the ratio of the 95th percentile/ 50th percentile BMIs for that age. I found an approximate range of .03 between the ratios at the ages I selected suggesting that using the median as the baseline creates a fairly accurate measurement.

or her adolescent's weight and not the adolescent's objectively measured body mass index. Therefore, the statistics measuring the relationships between this dependent variable and the independent variables indicate an increased or decreased likelihood that a parent will perceive his or her child as obese in contrast to an increase or decreased likelihood of having a high body mass index. The parent's perception of the adolescent's obesity is important to consider because the parent's perception most likely reflects the adolescent's perception of his or her own weight. If a parent perceives his or her child to be obese they will probably share that information with their child to try to encourage weight loss techniques. Also, the parent perception of the adolescent's weight may influence the dynamics of the family situation. Parent perception of adolescent obesity may be a source of tension between parents and the adolescent.

The Independent Variables

The three main hypotheses in this study were presented in the past research section. Hypothesis 1 examines the relationship between social class and adolescent obesity. In order to measure the class of the respondent's household using the data set, I used several common indicators of class in sociological studies, the total household income, race, the educational status of the parents, the absence of health insurance for the adolescent, and whether the household received government aid, specifically food stamps. I converted total household income into a working dummy variable because prior research has found health gains due to income for households above $20,000 per year are small and that income tends to have more of a threshold-type impact (Williams 1995). To convert total household income into a working dummy variable, I recoded the

variable to be a measure of whether the household is low income or not. Responses of a $20,000 per year household income or below were defined as a "low income household". Other responses are coded as "not low income households". I also recoded the education variable from the parent interview so that the variable compares those parents whose highest level of education is graduation from college or above and those who have never graduated from college. Race in the United States is also an important variable to consider because of its correlation to class. In this study race is measured using a series of non-white dummy variables.

Hypothesis 2 examines the relationship between family situation and adolescent obesity. These types of family support variables are perhaps more successfully analyzed through observation but in this study only the data set resources were available. I decided to use variables from the in-school survey and the parent interview asking about the relationship between the adolescent and the parent(s) to measure the concept of familial support. Other variables that I used to characterize the family situation were whether the parent reported being currently married, whether the parent(s) live at home with the adolescent, and whether the respondent regularly eats with his or her parents. In the case of the final variable, respondents were asked how many times per week they eat with their parents, responses ranged from 0 to 7 days per week. Seven days was the modal answer to the question therefore the variable was poorly distributed to use as a continuous variable. I decided to recode the variable so that it divided respondents into those who eat with their parents every day and those who do not.

The final hypothesis, hypothesis 3, examines the relationship between the respondent's lifestyle and adolescent obesity. To measure these concepts, I used a number of variables asking about what the respondent had eaten yesterday, how much the respondent had exercised in the past week, and how much the respondent had watched TV or videos in the past week. As a measure of the dietary restraint of the respondent, I used the variable from the questionnaire asking whether the individual is trying to lose weight by dieting. Although not all individuals with strong dietary restraint would consider themselves on a diet, individuals who are attempting to diet may have different dietary restraint than those who are not dieting. Dieting is a form of limiting one's food intake; therefore it may be a common response to obesity, especially because change in dietary habits is a frequently recommended treatment for obesity. For this reason, it is logical to anticipate some relationship between obesity and dieting.

Data Analysis and Results

Independent Variables and Linear Regression Results

I first examined obesity using the log of a continuous age-adjusted BMI variable and linear regression. Then I examined two different dichotomous variables using logistic regression. The first dichotomous variable separates the respondents into overweight/ not overweight based on whether their age and sex specific BMI was at the 85^{th} percentile level or higher. The second dichotomous variable separates the respondents into obese/ not obese based on whether the parent perceived the adolescent as being obese.

Table 1 shows the descriptive statistics for the dependent variables and all of the independent variables. For the independent variables, a yes response was coded as "1" and a no response was coded as "0". Therefore, a mean value close to one indicates a larger number of affirmative responses to the given attribute. This analysis includes only cases that were between 137 and 240 months at the time of the interview for which there is valid data on all independent and dependent variables. The male sample includes 737 cases. The female sample includes 773 cases.

The first model of independent variables (Table 2a and 2b) is an attempt to operationalize the social class of the respondent. The second model (Table 2a and 2b) includes variables related to the family situation and familial support of the respondent. The third model (Table 2a and 2b) analyzes the influence of the respondent's personal lifestyle choices on the dependent variable. The fourth model (Table 2a and 2b) combines all the independent variables in order to analyze the effects on the relationships between the variables when controlling for the other variables.

The relationship between the dependent variable (the logarithm of age-adjusted BMI) and the majority of the independent variables was very weak. However, a few of the variables had a correlation that was statistically significant. Using the same combinations of variables in linear regressions for both males and females, I found different variables to be statistically significant for the two sexes. For males in the first model the R-square value was just .017. This R-square value indicates that only 1.7% of the variation in the BMI is associated with the independent variables, showing that most

of the variation is not explained. The statistically significant variable at a p-value of less than .10 was the African American race variable. This race variable has a weak, negative relationship with the dependent variable, meaning that black respondents are associated with lower age-adjusted BMIs than white respondents. This finding is interesting because in earlier statistical analyses in which I examined the social class model separately from the other models, three out of the four race variables were statistically significant (African American, American Indian, and Asian) but only the African American variable remains significant in this analysis. This result suggests a particularly strong relationship between the African American race variable and the dependent variable. Although race is often correlated to socioeconomic status, in this case the direction of the relationship with the African American race variable is the opposite of the coefficient for low income households indicating a correlation with African American race to factors besides low income. This relationship remains negative and statistically significant in Model 4 with the introduction of the other variable groups. Model 4 for males with an r-square value of .035 has the highest r-square of all the models which indicates the creation of a more accurate model with all the variables than with any of the groups by themselves. However, this r-square value is still low and indicates that even with all the variables, the vast majority of the variation in the dependent variable is unexplained by the model. Only in Model 4 when the other variable groups are added does whether the adolescent has no health insurance become statistically significant at p-value less than .10. Like the African American race variable, whether the adolescent has no health insurance is negatively associated with the logged age-adjusted BMI. Since both African American race and no health insurance tend to be associated with lower

social class position, these findings do not seem to support the hypothesis that social class is negatively associated with logged age-adjusted BMI.

In the social class model for females, the R-square value for the model is .004. None of the variables measuring social class are statistically significant in either Model 1 or Model 4 for the female respondents. The r-square value for Model 4 for females is .028 which is also the highest r-square of any of the models for females. This finding demonstrates that for females as well as males it is beneficial to examine all the variables together rather than as separate groups. It is attention-grabbing that none of the variables that have statistically significant relationships with male respondents are statistically significant for females. Although the relationships are weak, it appears that social class, at least in the way it has been operationalized for this study has more influence on the BMI for males than for females.

The second model which addresses variables related to family situation and family support, also resulted in low R-square values for both males and females, .009 and .010 respectively. The only statistically significant variable for males at p-value less than .10 is whether the respondent eats with his or her parents daily. Eating with parents has a negative regression coefficient indicating a reduction in the logarithm of the age-adjusted BMI for males who regularly eat with their parents. This relationship may be due to a variety of sources. One possibility is that adolescents who eat with their parents have a closer relationship with them, but this explanation does not seem likely since the model also included variables measuring the closeness of the relationships between the

adolescent and his or her parent and none of these variables were found to be significant. Another option is that families who eat together may have more time to prepare more nutritional food than families who do not have time to eat together. Research tends to support this reasoning in the finding that adolescents who eat dinner with their family eat more healthy foods and less unhealthy foods than those adolescents who do not eat dinner with their family (Dietz 2001). In Model 4, when the other groups of variables are included, the "Do you eat with your parents every day?" variable is no longer statistically significant for males which indicates this relationship may be a measure of another factor such as social class which is one explanation why the variable does not remain significant when social class measures are added.

In Model 2 for females, two variables are statistically significant. The "Are you [parent] currently married?" variable is significant at a p-value of less than .10, and the "lives with father" variable is significant at a p-value of less than .05. This result is intriguing for many reasons. First, the direction of the relationship between the dependent variable and these two independent variables is opposite. Living with a father is positively correlated whereas whether the parent is currently married is negatively correlated. Second, although both variables indicate parental presence in the household, living with a father has a much higher statistical significance although the magnitude of the impact is quite similar (.077 versus .072). Third, these variables are only significant for females. To describe the discrepancy in the directions of the relationships, one possible explanation is marriage may be an indication of a positive family situation which may support healthier habits in the adolescent, whereas living with the father may not

have as much correlation with a positive family situation. Female adolescents who live with their father may feel more self conscious about their physical appearance which could negatively influence an individual's self-esteem and self-image or influence the adolescent's comfort level in the family making it more difficult to successfully maintain or achieve weight loss. Those individuals who live with a father are likely to be living in two-parent households. This type of household may have more resources to buy more food or go out to eat more often which can both lead to weight gain. Finally, female adolescents may tend to have stronger relationships with their parents than males of similar ages making females more susceptible to the influence of parental variables. Both the marriage variable and the "lives with father" variable remain statistically significant for females with the addition of the other two groups of variables in Model 4 suggesting the continued strength of these relationships even controlling for other factors. Although some of the results seem to support the hypothesis that a positive, supportive family situation is negatively associated with age-adjusted BMI, the "lives with father" relationship presents an exception to this theory. Since none of the relationship variables are significant, perhaps it is more important how a family creates a supportive environment rather than whether the individuals feel they are part of a supportive family situation.

Although individual practices are probably the most common factors associated with obesity, the results for these variables do not show a convincing relationship. The third model also resulted in low R-square values for both males and females of just .013 and .014 respectively. For males in Model 3, the statistically significant variable is

whether the adolescent watches TV 5 or more times a week (daily TV) with a p-value of less than .05. Daily television is negatively associated with logged age-adjusted BMI contradicting the common notion that sedentary activities such as watching TV have a negative impact on a person's weight. Perhaps increased television watching may indicate increased time spent interacting with peers which has been associated with increased physical activity (Dietz 2001). For females, the statistically significant variable in Model 3 is whether the respondent had eaten fruit / fruit juice the day before the survey. Fruit consumption is positively associated with the dependent variable indicating an increase in the age-adjusted BMI with an increase in fruit consumption. The inclusion of fruit in a daily diet may be an indication of a healthy diet, however this variable may also indicate a difference in access to fruit between social classes since fresh fruit is an expensive product in US grocery stores. In this way, fruit consumption may be an indication that higher and not lower social class is associated with increases in the dependent variable, but this theory is very tentative since none of the social class variables included in the study were found to have any significant relationship in females. Another possibility is that fruit and / or fruit juice is more commonly consumed by health-conscious, athletic girls who would tend to be more muscular and heavier than other girls their age. With both males and females the corresponding variable remains significant in Model 4; however for males the level of significance decreases for "daily TV" with the addition of the other sets of variables. These results are perhaps more interesting because they are unexpected. Much controversy exists over the influence of social factors in health patterns such as obesity, but it has become strongly accepted that changing personal eating and exercise habits are perhaps the most important factors

influencing weight control. The findings in Model 3 do not support the hypothesis that a healthy individual lifestyle is negatively associated with logged age-adjusted BMI for adolescents. The lack of correlation between the individual lifestyle variables and the dependent variable may support a stronger influence of biological influences such as genetics or fat cell physiology that were discussed earlier. However, the increase in the incidence of obesity in the United States over the past few decades seems to demand some further explanation than just biological causes.

Generally, the relationships between the independent variables representative of possible social influences on obesity are limited as indicated by the low R-square values and small level of statistical significance in the models. For the majority of the variables no significant relationship exists. Additionally, the variables that did prove statistically significant for one sex were not statistically significant for the other sex. The absence of consistent statistical significance between the sexes may indicate different influences of obesity depending on the sex of an individual but with only a few statistically significant findings this observation is made with very little certainty. I am reluctant to abandon the hypothesis of social causes of obesity, but so far with the regressions that I have tested, the data does not support the hypothesis of a strong influence of social factors on obesity.

Analysis of Dichotomous Overweight BMI Variable Results (Tables 3a and 3b)

The results of the logistic regression tests that were run using the same models for the independent variables as were used for the previous dependent variable provide additional evidence that does not support the hypothesis that there is a relationship

between sociological factors and adolescent obesity. For males, the daily TV variable is the only variable that is statistically significant in both the log of the age-adjusted BMI statistics and the whether the adolescent was overweight based on BMI statistics. In both cases, the correlation coefficient is negative which indicates a decreased chance of having an increased logged age-adjusted BMI or having an overweight BMI if the adolescent watches television daily. This result is puzzling considering television viewing is usually associated with sedentary lifestyles which tend to lead to weight gain and not weight loss. Perhaps television viewing occurs at high rates among all adolescents not just those who are overweight. In examining Table 3a, the results for males, the statistically significant variables in Model 1, at p-value less than .10 and p-value less than .05 respectively, are whether the parent taking the survey has a college education or higher and whether the parent's partner has a college education or higher. In Model 1, while the correlation coefficient for the parent's education is positive the coefficient for the partner's education is negative. This contrast in the direction of the relationship may indicate a difference in households where one parent has a college education or higher versus households where both parents have a college education or higher. These variables are no longer statistically significant when the other variables are added in Model 4. The only statistically significant variable at a p-value less than .10 in the family support model for males is whether the adolescent lives with his mother. The variable has a negative correlation with the variable showing whether or not the adolescent is overweight based on BMI. This relationship does not remain statistically significant when the other variables are added. In Model 3 for males, the statistically significant variable at p-value less than .05 is whether the adolescent watches TV 5 or more times per week. As

mentioned above, the correlation coefficient is negative and the variable remains statistically significant in the model that includes all the independent variable. The level of significance does decrease from p-value less than .05 to p-value less than .10.

Examining the results for female respondents demonstrates a continuation of the pattern that no variables of statistical significance overlap for males and females. Also, only three variables are statistically significant and the accompanying coefficients are small. The three variables are whether the adolescent's parents are married, whether the adolescent lives with her father, and whether the respondent reported eating fruit the day before the survey. Notably, all three of these variables overlap with variables that were statistically significant in the first statistical tests run with the log of the age-adjusted BMI dependent variable. The direction of the relationships with all three variables remains constant across the two tests as well. This overlap makes the relationships slightly more convincing but the correlations are at a low level of statistical significance. One possible connection between the marriage variable and the living with father variable is that they may both be measures of the presence of two parents in the home; however if they were really indications of the same thing the expectation would be that the relationship with the dependent variable would be in the same direction which is not the case. The results indicate a different influence caused in the households where the parents are married versus households where the father lives in the home. In this model, none of the independent variables attempting to measure social class are statistically significant either before or after the addition of the remaining variables.

Analysis of Parent Perception Results (Tables 4a and 4b)

As can be observed in Tables 4a and 4b the models used in testing the parents' perception of whether their adolescent is obese were slightly different from the models used with the other two dependent variables. The first model in this case uses all the independent variables used in the previous tests. The second model adds the dichotomous overweight BMI variable as an independent variable in order to examine the relationship between the parents' perceptions and the objective reality. For both males and females, the addition of the dichotomous overweight BMI variable has no impact on the other variables and does not share a statistically significant relationship with the dependent variable. Both observations suggest that the objective and subjective measures of obesity are measuring different things. The final model for the parent perception analysis adds a variable which measures the parents' perceptions of their own weights. If either parent identified themselves as obese the adolescent is categorized as having parents who perceive themselves as obese. The correlation between this variable and how the parent perceives his or her adolescent's weight is very strong at the highest level of statistical significance; however despite this strong correlation several other variables remain statistically significant in the final model demonstrating additional factors that influence a parent's perception.

Observing Model 3 for males (Table 4a) shows that while some variables go down in statistical significance with the addition of the parent's perception of their own weight, other variables stay at the same level of statistical significance and one variable even increases. The low income variable and the diet variable are no longer statistically

significant in Model 3. The American Indian race variable, the no health insurance variable, and the variable measuring whether the adolescent gets along well with his or her parents all remain statistically significant in the third model but the level of statistical significance decreases. The fruit variable remains at a constant level of statistical significance in all three models. Eating with parents increases in statistical significance in the third model and the coefficient increases as well. One possible explanation is that regardless of whether a parent perceives him or herself as fat, those families that eat together as a family may be more likely to perceive their adolescent as obese because they are more familiar with the adolescent's eating habits. For males, in addition to whether the parent perceives him or herself as obese, American Indian race, a lack of health insurance, a report of getting along well between parents and adolescent, and having consumed fruit or fruit juice the day before the survey are useful in predicting whether a parent will perceive his or her adolescent as obese.

In the third model for females (Table 4b), a similar variety of changes occur in the statistical significance of the variables with the addition of the parents' perceptions of their own weights. In this case, African American race, consumption of fruit or fruit juice, daily exercise, and whether the adolescent reported being on a diet all remained statistically significant at a constant level between the three models. In this third model, the "ate fruit" variable is negative whereas it is positive in all the objective measure models. Perhaps there is a belief about the value of the consumption of fruit and fruit juice that is reinforced by families. The daily exercise variable is negative in this model but has no impact in the objective models or in the parent perception model for males.

One possible explanation is that parents may assume that if their daughter is exercising she cannot be obese. Also, the dieting variable is positive in both this model and the parent perception model for males. While I had originally expected the relationship to be in the opposite direction, perhaps parents who perceive their adolescent as obese encourage the adolescent to go on a diet. The no health insurance variable only becomes statistically significant in Model 3 when the parents' own weight perceptions are added. The relationship is strong and positive indicating that those adolescents without health insurance are more likely to be perceived as obese by their parents regardless of their parents' personal weight perspective. A possible explanation is that those families without insurance may not be as likely to have discussed obesity with a health official and so those families may be more likely to make a judgment about obesity based on subjective physical characteristics only.

Preliminary Analysis of Results without the Diet Variable (Tables 5a and 5b)

One area that may have influenced the results in this study is the number of cases that were not included in the analysis. From a group of over 2000 adolescent males and over 2000 adolescent females, less than 750 of each gender were included in the statistical tests. It is difficult to determine whether there is a common link between the cases that were excluded that may have influenced the results, but whether the excluded cases would have had an impact or not is an important idea to consider in analyzing possible sources of error in this study. Upon further analysis of the frequencies for both the dependent and independent variables to try to isolate why many cases were eliminated from the models, I discovered a significant source of error. The dieting

question was a sub-question under a main question asking whether the adolescent was trying to lose weight. Only those respondents who were trying to lose weight went on to answer the dieting question. Because the data set has been reduced in this way, the majority of the results reported in this study are relevant only to the group of adolescents trying to lose weight and not adolescents overall. Despite this error, the results offer the opportunity to examine whether this subset of the population has particularly unique characteristics related to obesity.

To provide the basis for this analysis and to correct for the error, I re-estimated my final models excluding the variable about dieting, using all three dependent variables to attempt to assess the influence of the absence of the dieting variable. The sample size for both males and females goes up significantly when the diet variable is eliminated. The new sample sizes are 1053 females and 1100 males. Despite this drastic increase in the sample sizes which is a result of the sample now including all adolescents and not just those who were trying to lose weight, the influence on the overall equation fit is minimal. Specifically, the R-square values remain low and there are different results depending on whether the sample is males or females.

Despite the continued weak overall model fit, analyzing the models without the diet variable for males reveals a number of intriguing results about the independent variables. In the linear regression model for males which uses the log of the age-adjusted BMI as the dependent variable, the statistically significant variables are Asian race (negatively associated), whether the parents are currently married (negatively associated)

, whether the adolescent eats dinner with his parents daily (negatively associated), and whether he ate vegetables (negatively associated). Interestingly, none of these variables overlap with the statistically significant variables in that model when the diet variable was included. Although the statistically significant variables change when the diet variable is removed, the model remains unsuccessful in explaining the variation in the dependent variable with a low R-square value of just .028.

In the first logistic regression model which uses the age-adjusted BMI over the 85th percentile cutoff as the dependent variable, the statistically significant variables are whether the adolescent had eaten vegetables (negatively associated) and whether the adolescent reported watching TV daily (negatively associated). The daily TV variable had also been statistically significant for males in the model that included the diet variable. With the removal of the diet variable, the daily TV variable increased in statistical significance from p-value less than .10 to p-value less than .05. The correlation coefficient is negative in both models but becomes slightly more negative in the model without the diet variable. This negative relationship between TV watching and BMI seems counterintuitive but perhaps it is a reflection of a relationship between watching TV and another activity such as spending time with friends that could be more logically correlated to a decrease in overweight BMI.

Finally, in the third model which is the logistic regression using parents' subjective assessment of whether or not their adolescent is obese, American Indian race (positively associated), no health insurance (negatively associated), whether the parent

gets along well with the adolescent (negatively associated), whether the adolescent eats with his parents daily (positively associated), whether the adolescent ate fruit (positively associated), and the parents' perception of their own obesity (positively associated) were all statistically significant. These variables are the exact same independent variables that were statistically significant in the model that included the diet variable though there are some differences in the level of statistical significance for the variables between the two models. This finding may indicate that subjective measures of male adolescents' weights are less influenced by dieting than the objective measures of weight. The American Indian race and the no health insurance variables increase in the level of statistical significance, whereas the whether the parent gets along well with the adolescent and the whether the adolescent eats with his parent variables decrease in the level of statistical significance. The correlation coefficients also remain very similar between the two models. The biggest change in the coefficient is for the no health insurance variable in which the coefficient becomes significantly more negative in the model that does not include the diet variable, a change from -1.890 to -2.658. Within the sample of adolescents overall and not just those losing weight parents without health insurance are even less likely to assess their adolescent as obese which may suggestthat those parents without health insurance use whether their adolescent is trying to lose weight as a possible characteristic of obesity.

For females, the new results without the diet variable also interesting. In the model using the log of the age-adjusted BMI, the statistically significant variables are whether the adolescent is close to her dad (negatively associated), whether the parents are

currently married (negatively associated), whether the adolescent lives with her mother (negatively associated), whether the adolescent lives with her father (positively associated), and whether the adolescent had eaten fruit or fruit juice (positively associated). The model that included the diet variable only had three statistically significant variables out of the five statistically significant variables in the model without the diet variable, whether the parents were currently married, whether the adolescent lives with her father and whether the adolescent had eaten fruit or fruit juice. The level of statistical significance increased for the lives with father variable and decreased for eating fruit/ fruit juice. Once again the low R-square value of .021 for the linear regression model excluding the diet variable indicates the model's low level of predictive power for explaining the variation in the dependent variable.

In the model that uses the dichotomous age-adjusted BMI overweight/ not overweight dependent variable, the statistically significant variables for females are whether the parents are currently married (negatively associated), whether the adolescent lives with her mother (negatively associated) and whether the adolescent lives with her father (positively associated). In the model that included the diet variable, the lives with mother variable was not statistically significant and the ate fruit/ fruit juice yesterday variable was statistically significant. The level of statistical significance for both the whether the parents are currently married and the whether the adolescent lives with her father increases in the model that does not include the diet variable. The correlation coefficients for the overlapping variables are very similar between the models including and excluding the diet variable.

Finally, in the logistic regression model using the parents' subjective assessment of their adolescent's obesity as the dependent variable, the statistically significant variables are the exact same as in the model when the diet variable was included. Overall, the correlation coefficients are similar to those in the model that included the diet variable with most of the values decreasing slightly in the new model without the diet variable. Unlike other models, the level of statistical significance for the variables remains constant between the two models. The strong similarities between these two models may indicate that how a parent perceives an adolescent's obesity is very similar for both female adolescents who are trying to lose weight and for female adolescents in general.

Conclusion

There is little doubt about the rising rates of obesity in the United States among both adults and children. Obesity, due to the many health risks with which it is related, is a serious health hazard. Often obesity and weight control are considered as individual problems, but there have also been many studies examining influences outside of the individual such as social class, race, or neighborhood (Ross 1983, Olvera-Ezzell 1994, Ross 2001). The information available in these areas is not as prevalent or as conclusive as the information about research regarding the individual causes. In order to examine social factors involved in obesity in adolescents, I used data from Wave I of the Add Health survey conducted between 1994 and 1995. The concept of obesity was

operationalized for the main analysis through a logged, age-adjusted body mass index for the respondents. Using prior research, I identified three main areas of influence on an individual's weight control, social class, family situation, and personal lifestyle. Linear regression analysis examining the relationships between these various factors yielded some interesting results. The R-square values for all of the models are very low making it difficult to make any conclusive statements about the relationships between the models and the dependent variable. There are striking differences between the relationships of the variables and gender. None of the variables are significant for both males and females. Another important result is that the eating and exercise habits commonly associated with obesity were not found to be significant in this study.

The major puzzle in this study is why are there not larger r-square values? This question calls for further research examining not only personal habits but also social influences on obesity. One possibility would be examining two additional lifestyle variables, sports participation and whether the respondent walks to school because these factors have become increasingly important indicators of physical activity in an increasingly sedentary youth culture (Dietz 2001). Another important area for future study is further examination of families with obese children. If overarching social variables such as social class or family situation are truly significant, we should expect to find at least some examples of families with more than one obese child. Studying these cases may be particularly useful for discovering a common trend. In future research, concepts such as the supportiveness of a family situation may be more successfully operationalized through observation rather than survey questions.

The following quote presents an important aspect of this and other studies of obesity and other health related issues:

> While guarding against biological determinism is important, social scientists need to give greater attention to the biological mechanisms and processes through which social factors affect health and to the interrelationships between genetic factors and social variables. Much remains to be understood about the ways in which genetic susceptibilities combine additively or interactively with exposures in the social and physical environment to affect health at different stages of the life cycle and for persons living under varying environmental conditions. (Williams 1995)

The future of obesity research must examine both biological and sociological factors. Research demonstrates the largest penalties associated with obesity are connected to obesity at younger ages (Averett 1996), meaning it is important to continue to investigate causes of obesity in children and adolescents as well as adults. Due to the low significance of the personal lifestyle variables, the most fruitful area of future study may be in the other areas of social class and family environment. Another important area for future research is the direction of the correlations with obesity. Does a lower class position make it more likely for a person to become obese or do the stigmas surrounding obese individuals make it difficult for them to maintain their status in upper classes? If the latter is true, the most effective solution to obesity may be to attempt to change social stigmas associated with being overweight rather than blaming the individual for overeating or being lazy.

The dependent variable measuring the parent's perception of his or her adolescent presents some interesting findings for further study. First, a parent's perception of his or her own weight has a huge influence on how he or she perceives the weight of the

adolescent. It would be interesting to examine how a parent's perception of his or her adolescent's weight is formed and upon what the perception is based. What physical and emotional influences does a parent's perception of weight have on the children in that family? Clearly, the parent's perception of his or her own weight is important but how does that interact with the other variables that remained significant in the final model? The sociological ties with adolescent obesity as objectively defined by body mass index seem to be very limited; however there may be room for sociological research into how social factors influence perceptions of weight inside families.

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Table 1: *Descriptive Statistics*

	Male			Female		
	Mean	**Std. Deviation**	**N**	**Mean**	**Std. Deviation**	**N**
Dependent Variables						
Logged age-adjusted BMI	3.0941	0.175	737	3.1006	0.185	773
Age-adjusted BMI over 85th percentile	0.25	0.434	737	0.24	0.425	773
Parent's perception of adolescent having a problem with obesity	0.09	0.288	736	0.10	0.302	771
Independent Variables						
Low Total Household Income ($20,000 or less)	0.10	0.306	736	0.14	0.346	771
College Education or Higher	0.32	0.467	736	0.29	0.455	771
Partner has College Education or Higher	0.32	0.466	736	0.30	0.457	771
Hispanic Origin	0.07	0.263	736	0.08	0.270	771
Race - African American	0.16	0.368	736	0.17	0.379	771
Race - American Indian	0.03	0.181	736	0.04	0.200	771
Race - Asian	0.03	0.178	736	0.04	0.197	771
Adolescent has no health insurance	0.07	0.252	736	0.09	0.282	771
Receive food stamps	0.05	0.213	736	0.06	0.230	771
Are you very close to your mom?	0.91	0.286	736	0.91	0.284	771
Are you very close to your dad?	0.82	0.387	736	0.83	0.378	771
Do you get along well with your adolescent?	0.92	0.278	736	0.92	0.272	771
Are you (parent) currently married?	0.98	0.155	736	0.97	0.159	771
Do you eat with your parents every day?	0.44	0.497	736	0.45	0.498	771
Lives with mother	0.97	0.181	736	0.96	0.190	771
Lives with father	0.96	0.204	736	0.94	0.232	771
Ate yesterday - fruit/ fruit juice	0.81	0.396	736	0.77	0.418	771
Ate yesterday - vegetables	0.72	0.448	736	0.70	0.457	771
Daily TV	0.56	0.496	736	0.61	0.489	771
Daily exercise	0.27	0.444	736	0.26	0.436	771
Weight loss method – diet	0.20	0.400	736	0.16	0.369	771

Table 2a: *Linear Regression Statistics for Dependent Variable oflogged age -adjusted Body Mass Index and Independent Variables for Social Class, Family Situation, and Respondent Lifestyle for MALE respondents*

Independent Variables	Model 1 (Social Class)	Model 2 (Family Situation)	Model 3 (Lifestyle)	Model 4 (All)
Low Total Household Income ($20,000 or less)	0.040 (.025)	-	-	0.039 (.025)
College Education or Higher	0.020 (.016)	-	-	0.019 (.016)
Partner has College Education or Higher	-0.011 (.016)	-	-	-0.006 (.016)
Hispanic Origin	0.020 (.025)	-	-	0.025 (.025)
Race - African American	-0.035+ (.018)	-	-	-0.031+ (.018)
Race - American Indian	-0.053 (.036)	-	-	-0.041 (.037)
Race – Asian	-0.051 (.036)	-	-	-0.044 (.036)
Adolescent has no health insurance	-0.045 (.027)	-	-	-0.046+ (.028)
Receive food stamps	-0.032 (.033)	-	-	-0.026 (.034)
Are you very close to your mom?	-	0.013 (.024)	-	0.019 (.024)
Are you very close to your dad?	-	-0.010 (.017)	-	-0.011 (.018)
Do you get along well with your adolescent?	-	-0.002 (.023)	-	0.002 (.024)
Are you (parent) currently married?	-	0.029 (.042)	-	0.018 (.045)
Do you eat with your parents every day?	-	-0.026+ (.013)	-	-0.020 (.013)
Lives with mother	-	-0.058 (.041)	-	-0.038 (.041)
Lives with father	-	0.049 (.036)	-	0.041 (.037)
Ate yesterday - fruit/ fruit juice	-	-	-0.016 (.017)	-0.016 (.017)
Ate yesterday – vegetables	-	-	-0.022 (.015)	-0.023 (.015)
Daily TV	-	-	-0.029* (.013)	-0.022+ (.013)
Daily exercise	-	-	-0.013 (.015)	-0.012 (.015)
Weight loss method – diet	-	-	-0.007 (.016)	-0.006 (.016)
Constant	3.099 (.010)	3.085 (.060)	3.144 (.019)	3.122 (.066)
N	737	737	737	737
R-Square	0.017	0.009	0.013	0.035

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: Numbers in parentheses are standard errors.

Table 2b: *Linear Regression Statistics for Dependent Variable of logged age-adjusted Body Mass Index and Independent Variables for Social Class, Family Situation, and Respondent Lifestyle for FEMALE respondents*

Independent Variables	Model 1 (Social Class)	Model 2 (Family Situation)	Model 3 (Lifestyle)	Model 4 (All)
Low Total Household Income ($20,000 or less)	0.004 (.022)	-	-	0.008 (.022)
College Education or Higher	-0.016 (.017)	-	-	-0.015 (.017)
Partner has College Education or Higher	0.013 (.016)	-	-	0.010 (.017)
Hispanic Origin	0.002 (.026)	-	-	0.005 (.027)
Race - African American	0.001 (.018)	-	-	-0.010 (.019)
Race - American Indian	0.015 (.034)	-	-	0.014 (.034)
Race – Asian	0.022 (.034)	-	-	0.014 (.035)
Adolescent has no health insurance	0.017 (.025)	-	-	0.020 (.025)
Receive food stamps	-0.031 (.033)	-	-	-0.037 (.033)
Are you very close to your mom?	-	-0.009 (.026)	-	-0.019 (.026)
Are you very close to your dad?	-	-0.003 (.019)	-	-0.002 (.019)
Do you get along well with your adolescent?	-	-0.013 (.025)	-	-0.013 (.026)
Are you (parent) currently married?	-	-0.077+ (.043)	-	-0.076+ (.044)
Do you eat with your parents every day?	-	-0.007 (.014)	-	-0.011 (.014)
Lives with mother	-	-0.063 (.042)	-	-0.062 (.042)
Lives with father	-	0.072* (.035)	-	0.070* (.035)
Ate yesterday - fruit/ fruit juice	-	-	0.042* (.016)	0.042* (.017)
Ate yesterday – vegetables	-	-	0.004 (.015)	0.006 (.015)
Daily TV	-	-	0.022 (.014)	0.024 (.014)
Daily exercise	-	-	0.007 (.015)	0.006 (.015)
Weight loss method – diet	-	-	-0.018 (.018)	-0.020 (.018)
Constant	3.099 (.010)	3.194 (.058)	3.053 (.019)	3.156 (.062)
N	773	773	773	773
R-Square	0.004	0.010	0.014	0.028

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: Numbers in parentheses are standard errors.

Table 3a: *Logistic Regression Statistics for Dependent Variable of overwtbmi (defined as those in the 85th percentile or above for BMI by age) and Independent Variables for Social Class, Family Situation, and Respondent Lifestyle for MALE respondents*

Independent Variables	Model 1 (Social Class)	Model 2 (Family Situation)	Model 3 (Lifestyle)	Model 4 (All)
Low Total Household Income ($20,000 or less)	0.266 (.327)	-	-	0.390 (.343)
College Education or Higher	0.344+ (.208)	-	-	0.335 (.213)
Partner has College Education or Higher	-0.430* (.214)	-	-	-0.342 (.218)
Hispanic Origin	-0.034 (.340)	-	-	0.085 (.352)
Race - African American	-0.401 (.252)	-	-	-0.285 (.265)
Race - American Indian	-0.907 (.629)	-	-	-0.758 (.642)
Race – Asian	-0.601 (.557)	-	-	-0.534 (.565)
Adolescent has no health insurance	-0.450 (.393)	-	-	-0.442 (.403)
Receive food stamps	-0.247 (.461)	-	-	-0.122 (.490)
Are you very close to your mom?	-	0.422 (.338)	-	0.496 (.346)
Are you very close to your dad?	-	-0.082 (.228)	-	-0.043 (.236)
Do you get along well with your adolescent?	-	0.014 (.324)	-	0.012 (.331)
Are you (parent) currently married?	-	6.147 (8.571)	-	6.066 (8.403)
Do you eat with your parents every day?	-	-0.234 (.175)	-	-0.177 (.180)
Lives with mother	-	-0.933+ (.547)	-	-0.724 (.566)
Lives with father	-	0.886 (.565)	-	0.773 (.582)
Ate yesterday - fruit/ fruit juice	-	-	-0.109 (.215)	-0.121 (.224)
Ate yesterday – vegetables	-	-	-0.295 (.191)	-0.285 (.200)
Daily TV	-	-	-0.342* (.173)	-0.298+ (.180)
Daily exercise	-	-	-0.273 (.202)	-0.224 (.207)
Weight loss method – diet	-	-	0.209 (.209)	0.212 (.216)
Constant	-0.960*** (.127)	-7.391 (8.591)	-0.586* (.242)	-6.996 (8.428)
N	737	737	737	737
-2 Log likelihood	818.268	813.298*	820.573+	795.685*

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Intercept only model -2 Log likelihood = 830.526

Note: Numbers in parentheses are standard errors.

Table 3b: *Logistic Regression Statistics for Dependent Variable of overwtbmi (defined as those in the 85th percentile or above for BMI by age) and Independent Variables for Social Class, Family Situation, and Respondent Lifestyle for FEMALE respondents*

Independent Variables	Model 1 (Social Class)	Model 2 (Family Situation)	Model 3 (Lifestyle)	Model 4 (All)
Low Total Household Income ($20,000 or less)	-0.037 (.282)	-	-	-0.015 (.291)
College Education or Higher	-0.203 (.214)	-	-	-0.162 (.219)
Partner has College Education or Higher	0.077 (.208)	-	-	0.033 (.213)
Hispanic Origin	-0.094 (.337)	-	-	-0.081 (.348)
Race - African American	-0.171 (.237)	-	-	-0.355 (.252)
Race - American Indian	0.297 (.407)	-	-	0.271 (.421)
Race – Asian	0.307 (.410)	-	-	0.134 (.423)
Adolescent has no health insurance	0.039 (.319)	-	-	0.105 (.328)
Receive food stamps	-0.174 (.428)	-	-	-0.340 (.448)
Are you very close to your mom?	-	-0.356 (.310)	-	-0.460 (.323)
Are you very close to your dad?	-	0.087 (.246)	-	0.084 (.250)
Do you get along well with your adolescent?	-	-0.381 (.302)	-	-0.427 (.313)
Are you (parent) currently married?	-	-0.927+ (.497)	-	-0.967+ (.524)
Do you eat with your parents every day?	-	-0.143 (.175)	-	-0.195 (.182)
Lives with mother	-	-0.807 (.525)	-	-0.808 (.541)
Lives with father	-	0.955+ (.506)	-	0.936+ (.518)
Ate yesterday - fruit/ fruit juice	-	-	0.433+ (.221)	0.473* (.229)
Ate yesterday – vegetables	-	-	0.009 (.190)	0.022 (.197)
Daily TV	-	-	0.220 (.177)	0.278 (.182)
Daily exercise	-	-	-0.032 (.196)	-0.025 (.201)
Weight loss method – diet	-	-	-0.285 (.243)	-0.316 (.248)
Constant	-1.116*** (.128)	0.258 (.684)	-1.605*** (.259)	0.063 (.759)
N	773	773	773	773
-2 Log likelihood	843.341	834.018+	839.316	822.188

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Intercept only model -2 Log likelihood = 846.115

Note: Numbers in parentheses are standard errors.

Table 4a: *Logistic Regression Statistics for Dependent Variable of adolescent health problem – obesity and Independent Variables for socialfactors model, dichotomous overweight BMI variable, and parental perception of weight for MALE respondents*

Independent Variables	**Model 1 (All Independent Var.)**	**Model 2 (add overwtbmi)**	**Model 3 (add rentperf)**
Low Total Household Income ($20,000 or less)	0.976* (.458)	0.981* (.459)	0.813 (.552)
College Education or Higher	0.124 (.339)	0.112 (.340)	-0.111 (.378)
Partner has College Education or Higher	-0.298 (.340)	-0.281 (.342)	0.039 (.381)
Hispanic Origin	-0.188 (.548)	-0.177 (.546)	0.505 (.651)
Race - African American	0.064 (.379)	0.084 (.380)	0.613 (.447)
Race - American Indian	1.613** (.554)	1.646** (.555)	1.628* (.696)
Race – Asian	0.401 (.666)	0.428 (.667)	0.743 (.838)
Adolescent has no health insurance	-2.437* (1.071)	-2.425* (1.071)	-1.890+ (1.096)
Receive food stamps	0.288 (.608)	0.277 (.609)	0.436 (.773)
Are you very close to your mom?	0.512 (.579)	0.500 (.580)	0.253 (.648)
Are you very close to your dad?	0.058 (.380)	0.060 (.381)	-0.069 (.434)
Do you get along well with your adolescent?	-1.214** (.388)	-1.226** (.388)	-0.984* (.471)
Are you (parent) currently married?	1.489 (1.166)	1.437 (1.168)	0.787 (1.527)
Do you eat with your parents every day?	0.694* (0.280)	0.704* (.280)	0.913** (.325)
Lives with mother	19.383 (7678.713)	19.392 (7690.666)	19.132 (7017.789)
Lives with father	-0.664 (.855)	-0.694 (.856)	-0.040 (.997)
Ate yesterday - fruit/ fruit juice	0.761+ (.436)	0.776+ (.437)	0.794+ (.480)
Ate yesterday – vegetables	-0.138 (.323)	-0.117 (.324)	-0.055 (.369)
Daily TV	0.093 (.284)	0.109 (.285)	0.053 (.331)
Daily exercise	0.022 (.306)	0.035 (.307)	-0.379 (.368)
Weight loss method – diet	0.669* (.313)	0.672* (.313)	0.434 (.366)
Age-adjusted BMI over 85th percentile	-	0.252 (.310)	0.498 (.359)
Parental perception of own obesity	-	-	3.207*** (.369)
Constant	-23.115 (7678.713)	-23.147 7690.666	-24.586 (7017.789)
N	723	723	723
-2 Log likelihood	397.107***	396.463**	290.046***

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Intercept only model -2 Log likelihood = 446.338

Note: Numbers in parentheses are standard errors.

Table 4b: *Logistic Regression Statistics for Dependent Variable of adolescent health problem – obesity and Independent Variables for socialfactors model, dichotomous overweight BMI variable, and parental perception of weight for FEMALE respondents*

Independent Variables	**Model 1 (All Independent Var.)**	**Model 2 (add overwtbmi)**	**Model 3 (add rentperf)**
Low Total Household Income ($20,000 or less)	-0.331 (.451)	-0.331 (.451)	-0.440 (.501)
College Education or Higher	0.059 (.305)	0.060 (.305)	-0.244 (.357)
Partner has College Education or Higher	0.021 (.315)	0.025 (.315)	0.101 (.359)
Hispanic Origin	-1.015 (.672)	-1.017 (.673)	-0.679 (.757)
Race - African American	0.996** (.314)	0.992** (.314)	1.142** (.369)
Race - American Indian	0.692 (.515)	0.699 (.515)	0.288 (.563)
Race – Asian	-1.030 (1.051)	-1.034 (1.051)	-0.113 (1.088)
Adolescent has no health insurance	0.631 (.431)	0.633 (.431)	1.145* (.503)
Receive food stamps	0.104 (.636)	0.097 (.637)	-0.139 (.691)
Are you very close to your mom?	0.502 (.585)	0.490 (.587)	0.101 (.639)
Are you very close to your dad?	0.203 (.381)	0.207 (.381)	0.256 (.434)
Do you get along well with your adolescent?	-0.383 (.505)	-0.386 (.506)	-0.690 (.567)
Are you (parent) currently married?	0.978 (1.101)	0.963 (1.101)	0.291 (1.195)
Do you eat with your parents every day?	0.226 (0.267)	0.223 (.267)	0.299 (.307)
Lives with mother	1.137 (1.200)	1.123 (1.202)	1.189 (1.302)
Lives with father	-0.362 (.750)	-0.353 (.751)	-0.531 (.903)
Ate yesterday - fruit/ fruit juice	-0.552+ (.301)	-0.547+ (.302)	-0.631+ (.336)
Ate yesterday – vegetables	0.165 (.289)	0.162 (.289)	0.017 (.323)
Daily TV	-0.008 (.266)	-0.001 (.267)	0.073 (.306)
Daily exercise	-0.944** (.353)	-0.947** (.353)	-1.048** (.384)
Weight loss method – diet	1.565*** (.282)	1.561*** (.282)	1.488*** (.320)
Age-adjusted BMI over 85th percentile	-	-0.080 (.314)	-0.025 (.359)
Parental perception of own obesity	-	-	2.886*** (.342)
Constant	-4.407** (1.635)	-4.363** (1.643)	-4.446* (1.738)
N	766	766	766
-2 Log likelihood	443.846***	443.780***	344.801***

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Intercept only model -2 Log likelihood = 501.151

Note: Numbers in parentheses are standard errors.

Table 5a: *Linear Regression / Logistic Regression Statistics for All Dependent Variables of adolescent obesity andInde pendent Variables excluding "Weight loss method –diet" for MALE respondents*

Independent Variables	**DV 1 – Logbmi (Linear Regression)**	**DV 2 – Overweight BMI (Logistic Regression)**	**DV 3 – Health problem – obesity (Logistic Regression)**
Low Total Household Income ($20,000 or less)	0.026 (.021)	0.126 (.268)	1.053* (.503)
College Education or Higher	0.017 (.013)	0.220 (.173)	-0.011 (.333)
Partner has College Education or Higher	-0.009 (.013)	-0.208 (.171)	0.202 (.332)
Hispanic Origin	0.009 (.021)	-0.096 (.285)	0.112 (.590)
Race - African American	-0.021 (.015)	-0.133 (.199)	0.161 (.396)
Race - American Indian	-0.041 (.031)	-0.601 (.500)	1.666** (.601)
Race – Asian	-0.056+ (.030)	-0.589 (.457)	0.727 (.755)
Adolescent has no health insurance	-0.029 (.022)	-0.121 (.288)	-2.658* (1.091)
Receive food stamps	-0.037 (.030)	-0.181 (.407)	0.886 (.645)
Are you very close to your mom?	0.020 (.019)	0.334 (.260)	0.068 (.527)
Are you very close to your dad?	-0.013 (.015)	-0.094 (.196)	-0.284 (.385)
Do you get along well with your adolescent?	0.016 (.020)	0.115 (.264)	-0.750+ (.413)
Are you (parent) currently married?	-0.062+ (.035)	-0.017 (.466)	1.708 (1.397)
Do you eat with your parents every day?	-0.024* (.011)	-0.190 (.148)	0.590* (.287)
Lives with mother	-.009 (.032)	-0.328 (.402)	18.422 (5544.954)
Lives with father	0.018 (.030)	0.246 (.403)	-0.127 (.883)
Ate yesterday - fruit/ fruit juice	0.001 (.014)	0.029 (.185)	0.808+ (.454)
Ate yesterday – vegetables	-0.029* (.013)	-0.374* (.160)	0.039 (.328)
Daily TV	-0.015 (.011)	-0.330* (.146)	-0.036 (.295)
Daily exercise	-0.003 (.012)	-0.053 (.164)	-0.403 (.325)
Age-adjusted BMI over 85th percentile	-	-	0.344 (.323)
Parental perception of own obesity	-	-	3.108*** (.327)
Constant	3.176 (.052)	-0.711 (.675)	-24.431 (5544.954)
N	1053	1053	1034
-2 Log likelihood	-	1179.779	365.958***
Intercept only model -2 Log likelihood	-	1203.118	540.517
R-Square	.028	-	-

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: Numbers in parentheses are standard errors.

Table 5b: *Linear Regression / Logistic Regression Statistics for All Dependent Variables of adolescent obesity andInde pendent Variables excluding "Weight loss method –diet" for FEMALE respondents*

Independent Variables	**DV 1 – Logbmi (Linear Regression)**	**DV 2 – Overweight BMI (Logistic Regression)**	**DV 3 – Health problem – obesity (Logistic Regression)**
Low Total Household Income ($20,000 or less)	0.007 (.020)	-0.044 (.252)	-0.480 (.446)
College Education or Higher	-0.018 (.014)	-0.245 (.179)	-0.412 (.319)
Partner has College Education or Higher	0.002 (.014)	-0.097 (.177)	0.127 (.316)
Hispanic Origin	0.005 (.022)	0.036 (.274)	-0.669 (.682)
Race - African American	-0.012 (.016)	-0.329 (.207)	0.874** (.319)
Race - American Indian	0.016 (.030)	0.198 (.370)	0.780 (.483)
Race – Asian	-0.001 (.028)	-0.001 (.354)	-0.477 (1.065)
Adolescent has no health insurance	0.016 (.022)	0.086 (.278)	0.981* (.458)
Receive food stamps	-0.041 (.028)	-0.504 (.382)	0.011 (.575)
Are you very close to your mom?	-0.005 (.021)	-0.316 (.252)	-0.138 (.497)
Are you very close to your dad?	-0.028+ (.016)	-0.253 (.196)	0.242 (.375)
Do you get along well with your adolescent?	-0.006 (.021)	-0.315 (.251)	-0.537 (.478)
Are you (parent) currently married?	-0.053+ (.032)	-0.793* (.378)	-0.471 (.730)
Do you eat with your parents every day?	-0.013 (.012)	-0.233 (.151)	0.081 (.266)
Lives with mother	-0.065+ (.036)	-0.831+ (.452)	1.216 (1.198)
Lives with father	0.074** (.028)	0.963* (.403)	-0.259 (.683)
Ate yesterday - fruit/ fruit juice	0.024+ (.014)	0.216 (.185)	-0.501+ (.294)
Ate yesterday – vegetables	-0.001 (.013)	-0.075 (.163)	-0.105 (.282)
Daily TV	0.016 (.012)	0.202 (.150)	-0.013 (.260)
Daily exercise	0.002 (.013)	-0.039 (.165)	-1.101** (.354)
Age-adjusted BMI over 85th percentile	-	-	-0.151 (.313)
Parental perception of own obesity	-	-	2.773*** (.298)
Constant	3.163 (.049)	.328 (.594)	-3.392* (1.465)
N	1100	1100	1088
-2 Log likelihood	-	1189.259+	457.729***
Intercept only model -2 Log likelihood	-	1219.248	612.791
R-Square	.021	-	-

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Note: Numbers in parentheses are standard errors.