Perceived Weight, Actual Weight, and Risky Behaviors:

Racial and Gender Disparities in U.S. Adolescents

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THESIS

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This thesis is dedicated to the most important people in my life: my son Noah, who always reminds me that life is beautiful and full of wonders, my husband Stephen, without whom this would never have been accomplished, my late father Andrei and my mother Elena who made me the person I am today, and my parents in law, Carl and Gladys who always believed in me and supported me.

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Summary

Parallel with the rise in obesity prevalence among adolescents there has been an increasing prevalence in weight misperceptions with important differences across gender, race/ethnicity, and socioeconomic status (SES). This dissertation is the first to investigate the relationship between weight misperceptions and adolescent body mass index (BMI), the importance of weight misperceptions as determinants of racial/ethnic disparities in BMI, the differential effect of weight misperceptions across the adolescent BMI distribution, as well as the importance of different measures of weight as determinants of adolescent risky sex, using a nationally representative panel of adolescents. The results suggest that weight under-perceptions are significantly associated with adolescent BMI even after controlling for time constant individual-level unobservables. Results show that cross-sectional ordinary least squares methods (OLS) over-estimates the association between weight under-perceptions and BMI. The results based on the OLS model reveal that weight under-perception (compared to correct identification of one's weight status) is associated with 1.8 higher BMI units for female, and 2.7 higher BMI units for male adolescents, respectively, compared to results based on an individual-fixed effects model (FE) of 0.7 and 0.9 higher BMI units for adolescent females and males, respectively. I find an income gradient for males but not for females, with male adolescents from high-income households having statistically significant lower magnitudes of association of weight under-perception and BMI than their low-income counterparts. In addition, the association between weight under-perception and BMI is significantly higher for black compared to white female adolescents. Analyses stratified by gender, race, and SES, reveal complex significant associations between weight under-perception and adolescent BMI. Oaxaca-Blinder decomposition analysis shows that accounting for weight misperceptions, in addition to

individual and contextual factors, increases the total explained portion of the black-white BMI gap from 44.7% to 54.3% for females and from 63.3% to 74.3% for males but only slightly increases the total explained portion of the Hispanic-white gap from 62.8% to 63.1% for females and from 78.3% to 80.3% for males. Weight misperceptions explain 13.0% of the black-white female BMI gap, 18.3% of the black-white male BMI gap, 3.3% of the Hispanic-white female BMI gap, and 2.4% of the Hispanic-white male gap. Individual level fixed effects quantile regressions show that weight under-perceptions are significantly associated with adolescent BMI, particularly for adolescents about at or above the 75^{th} quantile. Analyses stratified by race/ethnicity and SES show complex patterns of associations. Turning to the relationship between measures of weight and adolescent risky sex, results show that youth who have actual weight categories or perceived weight categories that are seen as unattractive by their cultural/social group (i.e., overweight white and underweight black and Hispanic adolescents) are more likely to postpone sexual debut. Among sexually active adolescents, actual weight or perceived weight that is seen as unattractive by one's cultural/social group is associated with increased number of sex partners and with decreased odds of contraceptive use. School programs aimed at teaching correct weight identification and interpretation may be an invaluable tool in addressing both the obesity crisis and risky behavior prevention. As research has shown that adolescent actual and perceived weights are both influenced by the weight status of people around them, public health programs aimed at educating children and adolescents about correctly identifying one's weight status may have spillover effects onto the wider community. Further research using longitudinal data or randomized intervention studies will be necessary to understand the full impact of weight perceptions on obesity, risky behaviors and their future life trajectory.

Part One

Chapter 1: Introduction

Obesity and risky sexual behaviors are two of the top ten causes of preventable deaths in the U.S. (Mokdad et al., 2004), with obesity being responsible in 2005 for one in every ten adult deaths (Danaei et al., 2009). In addition, obesity and risky sexual behaviors are two of the top causes of adolescent and young adult morbidity (Blum and Qureshi, 2011). The economic burden associated with obesity and risky sexual behaviors is also tremendous, with an estimated $209.7 billion in direct health-care and productivity losses each year for obesity (Cawley and Meyerhoefer, 2012) and $14.7 billion for sexually transmitted diseases (Chesson et al., 2004). Market failures arise because large portions of these expenditures are being shifted on the consumers through Medicaid and Medicare or higher private-group insurance premiums. In order to create policies that will help correct these market failures, a good understanding of the determinants of obesity and risky sexual behaviors is necessary.

There are large bodies of literature documenting the determinants of obesity and risky sexual behaviors. Much of this research investigates the impact of personal characteristics (e.g. socioeconomic status (SES), race /ethnicity, gender, etc.), economic contextual variables (e.g. prices, taxes, etc.), as well as neighborhood characteristics (e.g. poverty level and racial composition) on the development of obesity and risky sexual behaviors. The importance of social and cultural norms, although acknowledged, is much less documented.

One way that social and cultural norms may influence the development of obesity and the initiation and intensity of risky sexual behaviors is through their influence on weight perceptions. Research has documented that social and cultural norms regarding weight are related to

racial/ethnic differences in weight perceptions. Black and Hispanic norms concerning ideal weight and weight gain are different than the corresponding white norms (Powell and Kahn, 1995;Thompson et al., 1996; Barroso et al., 2010; Gil-Kashiwabara, 2002). Although white norms uphold low weight bodies as attainable and ideal, black and Hispanic norms emphasize heavier weights as desired and ideal. These differences in social and cultural norms imply that the indirect cost of obesity related to social stigma or social ridicule is higher for whites than their black and Hispanic counterparts.

Social and cultural norms surrounding weight status also suggest that the accuracy of weight perceptions may differ between social and cultural groups. Weight misperception is the discrepancy between an individual's perception of his or her weight status and his or her actual weight status based on clinical definitions of weight. There is some evidence that weight misperception may be an important factor in the development of obesity (Flynn and Fitzgibbon, 1998; Salcedo et al., 2010; Vaughan et al., 2008). Weight misperception may be important because individuals who do not recognize that they have a higher weight than what clinically is defined as normal may lack the incentive necessary to engage in weight control behaviors like exercising and dieting (Flynn and Fitzgibbon, 1998; Johnson-Taylor et al., 2008; Paeratakul et al., 2002; Salcedo et al., 2010; Vaughan et al., 2008).

Previous research has not studied differences in weight misperceptions as potential contributors to individual weight and to racial/ethnic disparities in weight outcomes. There is also a scarcity of empirical evidence regarding the association between weight misperceptions and risky behaviors, such as engaging in unsafe sex and early sexual debut.

The current research addresses part of this research gap by studying the importance of social and cultural norms in the development of obesity, early sexual debut, and risky sexual

behaviors. Although social and cultural norms are not observed directly, it is hypothesized that belonging to a certain social or cultural group is a proxy for upholding its norms.

This dissertation consists of two inter-related parts. The first part investigates in three separate studies the role that the accuracy of weight perceptions plays in explaining current obesity trends and the racial/ethnic adolescent weight gap. The second part investigates the role different measures of weight play in early sexual debut and risky sexual behaviors for adolescents.

Chapter 2: Study One: Weight Misperceptions and Actual Weight — A Longitudinal Analysis

Obesity reached an unprecedented level in the U.S. with one in three adults and one in six children being obese in 2011 (CDC, 2011). Although in the past two years obesity rates reached a plateau in almost all US states (Levi, et al., 2013), among adolescents the obesity rate remains high, with 20.5% of adolescents being obese in 2011-12, which represents a 32% increase from 15.5% in 1999-2000 (Ogden et al., 2014; Ogden et al., 2002). High rates of obesity among adolescents represent a major public health concern given that obesity tracks into adulthood and is accompanied by a series of negative health, educational, labor and marriage market outcomes (Freedman et al., 2005; Han et al., 2009; Han et al., 2011; Sabia, 2007; USDHHS, 2001).

There is solid evidence of weight differences between white individuals and members of racial/ethnic minority groups (Pan et al., 2009; Flegal et al., 2012; Ogden et al., 2014). The gap is largest between blacks and whites, and the differences are much sharper for women than for men. The main factors identified as responsible for these discrepancies in weight are differences in individual characteristics such as socioeconomic status (SES) and family characteristics, as well as differences in economic contextual factors such as food prices, food and physical activity outlets density, and median neighborhood income (Gordon-Larsen et al., 2006; Gordon-Larsen et al., 2003; Larson et al., 2009; Powell and Chaloupka, 2011; Powell et al., 2006; Wang and Zhang, 2006; Zhang and Wang, 2004). In addition, particularly for Hispanic adolescents, literature shows that years since migration to the US are important predictors of obesity status (Gordon-Larsen et al., 2003; Kandula et al., 2004; Popkin & Udry, 1998) (for more details see Appendix A). However, these factors do not fully explain the exponential increase in obesity rates, and are able to explain only a modest portion of the racial/ethnic weight gap, especially the

black-white weight gap for women (Powell et al., 2012). One additional factor that could be responsible for the individual trends in obesity and the racial/ethnic BMI gap is the accuracy of weight perceptions.

Literature Review

Weight Perception Formation: Racial/Ethnic, Gender, and SES Differences

There is a large body of literature investigating racial and ethnic differences in weight perceptions. The predominant Western white culture emphasizes the importance of physical appearance for success and life satisfaction, with the ultra-thin body seen as attainable and ideal, especially for females (Alegria et al., 2007; Stice, 1994; Warren et al., 2005). The sociocultural theoretical model proposed by Stice (1994) suggests that racial and ethnic groups with non-Western cultures of origin may not internalize the ultra-thin ideal body image embraced by the Western culture, and may not place as much value on physical appearance as a means for success and life satisfaction. As a result, individuals belonging to non-white groups may have different weight ideals and perceptions when compared to their white counterparts (Alegria et al., 2007; Chamorro and Flores-Ortiz, 2000; Warren et al., 2005).

Cultural attitudes towards weight may influence individual weight perceptions through body weight satisfaction, perceived desirability, and perceived attractiveness. For example, there is evidence of racial and ethnic differences in the perception of attractiveness and romantic desirability as a function of body size, with blacks and Hispanics preferring larger body sizes than whites (Barroso et al., 2010; Gil-Kashiwabara, 2002; Powell and Kahn, 1995; Thompson et al., 1996). Barroso and colleagues (2010) report that black and Hispanic adolescent males perceive heavier girls as being less arrogant, better communicators, and having higher self esteem than their thin counterparts. Black and Hispanic adolescent girls report preferring males

that are heavier both for aesthetic and for safety reasons (Barroso et al., 2010). Lower social stigma is associated with being overweight among blacks, with black males reporting much less stigma than white males when thinking about dating a heavy female (Harris et al., 1991; Thompson et al., 1996). Research indicates that in describing beauty and attractiveness, black teens place less emphasis on physical characteristics and more emphasis on psychological traits, whereas white teens are more likely to associate beauty with thinness and are more likely to believe that thinness enhances their romantic appeal (Kumanyika et al., 1993; Parker et al., 1995; Poran, 2002; Vaughan et al., 2008; Wolf, 1991). In addition, black adults and teens report substantially higher levels of body shape and size satisfaction compared to their white and Hispanic counterparts (Adams et al., 2000; Chandler-Laney et al., 2009; Kelly et al., 2005; Miller et al., 2000; Roberts et al., 2006; Smith et al., 1999; Thompson et al., 1997).

Racial and ethnic differences in body satisfaction can be partially explained by differences in body ideals, with black and Hispanic youths having heavier body ideals than whites (Barroso et al., 2010; Kronenfeld et al., 2010). Rucker and Cash (1992) found that in a sample of 104 black and white college student females there were no racial/ethnic differences in weight self-perceptions. However, they did find racial/ethnic differences in body size ideals, with black youths choosing larger body sizes as ideals than whites do. Fitzgibbon and colleagues (2000) examined differences between body image and body ideals and found that body dissatisfaction occurs at lower BMI levels for white women when compared with their black and Hispanic counterparts . White women reported dissatisfaction at BMI levels corresponding to clinically normal weight, whereas black and Hispanic women did not report body dissatisfaction until they were almost clinically obese. Kronenfeld and colleagues (2010) also found that black women chose smaller silhouettes to represent their current size than their white counterparts, and

they also reported a preference toward larger silhouettes when compared to the ideal silhouettes preferred by white women. Similar to black women, research shows that black men have higher body ideals than their white and Hispanic counterparts (Adams et al., 2000; Smith et al., 1999; Thompson et al., 1997).

With respect to gender differences in weight perceptions, the literature shows that adolescent female weight perceptions are influenced by the ultra thin body ideal emphasized in the media, whereas male weight perceptions are influenced by larger and more muscular body ideals (Cachelin et al., 2002; Cohane and Pope, 2001; Damarest and Allen, 2000; McCreary and Sasse, 2000; Neumark-Sztainer et al., 2002; Wolf, 1991). These gender differences in ideal weight might be responsible for the higher incidence among males for misperceiving an overweight or obese self as normal (Brener et al., 2004; Kuchler and Variyam, 2003; Paeratakul et al., 2002; Wang et al., 2009).

Weight perceptions also differed substantially by SES. Dorsey and colleagues (2009) found that lower educated obese adults have higher odds of weight misperceptions compared to their more highly educated peers. Kuchler and colleagues (2003) found that low-education and low-income individuals were more likely to perceive their weight status as lower than their actual weight status when compared to their high-education, high-income counterparts (see also Chang and Christakis, 2003).

Weight Misperceptions and Actual Weight

Parallel to the rising obesity rates in the U.S., the incidence of weight misperceptions among overweight and obese individuals increased substantially during the same period. The percentage of overweight and obese individuals who incorrectly perceived themselves as normal weight rose significantly (increase of 11.6% and 27.3% for males and females, respectively)

between 1988-1994 and 1999-2004 (Burke et al., 2010; Johnson-Taylor et al., 2008). Weight misperceptions may be of particular importance in understanding the increased incidence of obesity among adolescents, given that, for this subgroup, perceptions of weight status independent of actual weight status have been shown to be important determinants of weight control mechanisms such as exercising and dieting, (Desmond et al., 1986; Emmons, 1994; Strauss, 1999). Adolescents who fail to recognize their weight status as overweight are at increased risk for obesity (Brener et al., 2004; Flynn and Fitzgibbon, 1998; Powell et al., 2010).

A large body of literature investigating adolescent weight perceptions shows that the degree of weight misperceptions differs substantially by race/ethnicity, gender, and SES (Barroso et al., 2010; Brener et al., 2004; Chithambo and Huey, 2013; Kuchler and Variyam, 2003; Thompson et al., 1996). A number of recent studies reported that weight misperceptions were more pronounced among black and Hispanic youths, who were more likely to underestimate their clinical weight status (Chitambo and Huey, 2013; Brener et al., 2004). For example, Brener and colleagues (2004) showed that among obese high school students 27.4%, 14.8%, and 13.7% of the black, Hispanic, and white adolescents respectively misperceived their weight as normal, while 64.5%, 54.8%, and 44.9% of the overweight black, Hispanic, and white adolescents respectively, misperceived their weight as normal.

Although there are numerous studies documenting the incidence of weight misperceptions, the vast majority of these studies used descriptive or qualitative designs. To date, there are only two studies that are investigating the relationship between weight perceptions and actual weight using econometric tools.

Fletcher (2012)

Fletcher (2012) looked at the impact of actual weight categories on weight self-perceptions, self-perceived attractiveness and assessed attractiveness, using the third wave of the Add Health survey. Using a cross-sectional multinomial logit specification, Fletcher (2012) found that black and Hispanic respondents who were clinically overweight or obese had 60% lower odds than their white counterparts of having accurate weight self-perceptions. In addition, black and Hispanic overweight and obese individuals were more likely to report higher self – perceived attractiveness when compared to their white counterparts. These findings were more robust for females than for males. When independent assessments of attractiveness were analyzed, the results showed that attractiveness ratings were most heavily penalized for being overweight or obese if the rater was either white or Hispanic, with black raters being the least likely to see people as less attractive for being overweight or obese. Further, white raters did not differentiate by race when rating the attractiveness of overweight or obese people. However black and Hispanic interviewers gave smaller penalties to black and Hispanic respondents for being overweight or obese. This study suggests that there are important racial differences in the self-perceived weight status, self-perceived attractiveness, and assessed attractiveness.

Fletcher (2012) failed to address potential biases that can arise from reverse causality (i.e. in addition to actual weight influencing the accuracy of weight perceptions, the accuracy of weight perceptions might be influencing actual weight) or from the presence of unobservables such as peer influences that could affect both weight perceptions and actual weight. These potential problems highlight the endogenous nature of this topic and the need for more research. The first study of this dissertation tries to fill some of the existing gap.

Cuypers and Colleagues (2012)

The second study that investigates the relationship between weight perceptions and actual weight was a longitudinal study that looked at how misperceiving oneself as overweight during teenage years influences adult BMI (Cuypers et al., 2012). The study only examined teens with a normal weight that misperceived their weight as heavier than it actually was (over-perceiving their weight). Thus, this study does not provide any evidence regarding teens that misperceive their weight as being lower than clinically defined or any evidence about what happens in teens that were underweight or overweight and misperceived their weight status.

Cuypers and colleagues (2012) used a longitudinal panel of normal weight teens living in Norway that were between 13 -19 years old in the first wave of the study and were assessed again 11 years later. This research found that normal weight teens that misperceived their weight status as heavier than clinically defined were more likely to become overweight or obese adults, when compared to their normal weight counterparts that correctly identified their weight. In the long run, teens that misperceived their weight had 0.66 higher BMI units gained than their counterparts that correctly identified their weight. These effects were higher for girls than for boys. Controlling for personal characteristics (like physical activity levels, health status, etc.) and SES, the study provides some evidence that for normal weight adolescents, misperceiving one's weight status as higher than it is during adolescence, may lead to higher weight gain, overweight, or obesity development in adulthood. The authors explained their findings using the "dieting makes you fat" theory postulated by Cannon and Einzing (1983; see also Levin, 2008). According to this theory, overweight individuals who repeatedly try to lose weight have a tendency to become overweight again. Cuypers and colleagues (2012) believe that this theory can be expanded to normal weight adolescents who over- perceive their weight.

Both Fletcher's (2013) and Cuypers and colleagues' (2012) studies are important contributions to the literature. However both studies have significant limitations. Fletcher (2013) uses only a cross-sectional design and did not attempt to address the potential endogeneity problem, while Cuypers and colleagues (2012) only looked at normal weight adolescents who over perceived their weight status. This dissertation attempts to address the limitations of both of these studies.

In the US, research shows that the under-perception of weight (i.e. self-perceiving one's weight as lower than it actually is) is an important problem among minority adolescents (Chitambo and Huey, 2013; Brener et al., 2004), while over-perception of weight (i.e. self-perceiving one's weight as higher than it actually is) is an important problem among white adolescents (Pareatakul et al., 2002; Felts et al, 1992; Yuan, 2010). Therefore, study one of this dissertation analyzes the relationship between both under-perceptions and over-perceptions for adolescents from all weight categories. In addition a discussion regarding endogeneity sources and possible ways to address it is presented.

Research Questions and Hypotheses

Given the evidence presented above regarding the association between weight misperceptions and actual weight, the following research questions and hypotheses will be investigated:

Q: Are weight misperceptions associated with adolescent BMI?

Q1a: Is the effect of weight misperceptions on actual weight different by race/ethnicity?

Q1b: Is the effect of weight misperceptions on actual weight different by SES? For example, will individuals with higher SES be less likely to misperceive their weight than their lower SES counterparts?

H1: Under-perceptions of weight are associated with increase BMI.

H1a: The effect of weight under-perceptions on adolescent BMI is stronger for black and Hispanic adolescents.

H1b: The effect of weight under-perceptions is stronger for low SES adolescents as compared to their high-SES counterparts.

H2: Over-perceptions of weight are associated with decreased BMI.

H2a: The association of weight over-perceptions with lower BMI is stronger for white adolescent females as compared to their black and Hispanic counterparts.

H2b: The association of weight over-perceptions with lower BMI is stronger for high-SES adolescent females as compared to their low-SES counterparts.

Analytical Framework: Weight Perceptions and Healthy Weight

The analytical framework used in this dissertation is based on Grossman's (1972) seminal work on the demand for health. Individuals maximize utility as a function of their health status and other utility-enhancing commodities, subject to their individual income and time constraints. In this model, health is a durable capital stock with the outcome good health. Individuals produce the commodity good health using market inputs (exercising, medical services, diet, etc.) and their personal time. They inherit an initial stock of health that depreciates at increasing rate with age and can be increased by investments. Environmental variables (like education) determine the

efficiency in creating good health. Health is a consumption commodity (good health directly enhances individual utility) and an investment commodity (it determines the total amount of time available for market and non-market production). The shadow price of health increases with age if the stock of health depreciates with age and decreases with education. The Grossman model is presented below:

$$Max\ U = U(\emptyset_0 H_0,\ \emptyset_1 H_1,\ \dots,\ \emptyset_i H_i)$$

s.t.

$$H_{i+1} - H_i = I_i - \delta_i H_i$$

$$I_i = I_i(M_i, TH_i, E_i)$$

$$Z_i = Z_i(X_i, T_i, E_i)$$

$$\sum \frac{P_i M_i + V_i X_i + W_i(TL_i + TH_i + T_i)}{(1+r)^i} = \sum \frac{W_i \Omega}{(1+r)^i} + A_0$$

where, U=utility

φ= service flow per unit of health stock

H_0= stock of initial health

H_i= Stock of health in period i

$\varphi_i H_i = h_i$= total consumption of health service at time i

δ_i=exogenous rate of depreciation at time i

I_i= gross investment

M_i= vector of goods purchased in the market that contribute to gross investment in health

E_i= stock of human capital

Z_i = composite commodity that enters the utility function at time i

X_i= goods input in the production of commodities Z_i

T_i= time spent producing the commodity Z_i

TH_i= time spent in producing health

TL_i= sick time due to illness and injury

TW_i= time spent working

Ω= total available time

P_i= price of M_i

V_i= price of X_i

A_0=initial assets

W_i= hourly wage rate

r=market interest rate

In this model the optimal health stock is endogenous. It is obtained when marginal benefit is equal to the marginal cost of adding an additional unit of health stock. The marginal benefit of adding an additional unit of health stock is the direct utility associated with an increased level of good health and the indirect utility of an increase in income and in household production due to increases in time available now as a result of better health. The marginal cost of an additional unit of health stock is represented by all the direct costs related to its production (related to the price of inputs necessary to produce health such as diet, exercise, medical services, etc.) and the opportunity costs (related to individuals' wage rates) associated with the production of this additional unit of health stock. Formally in equilibrium:

$$G_i\left[W_i + \left(\frac{Uh_i}{\lambda}\right)(1+r)^i\right] = \pi_{i-1}(r - \widetilde{\pi_{i-1}} + \delta_i)$$

where, $G_i = \frac{\partial h_i}{\partial H_i}$ = the marginal product of health capital

$Uh_i = \frac{\partial U}{\partial h_i}$ = marginal utility of healthy time

λ = marginal utility of wealth

π_{i-1}= marginal cost of gross investment in health in period i-1

$\widetilde{\pi_{i-1}}$ = percentage rate of change in marginal cost between period i-1 and period i. In other words, in equilibrium, the discounted marginal value to the consumer of the output produced by health capital must equal the supply cost of capital.

Using Grossman's model as a departure point, study one investigates the role played by weight misperceptions in the production of healthy weight. In this model, healthy weight is an input in the production of good health (individuals with healthy weight are more productive in generating good health), and a utility enhancing commodity (the effect on utility operates through individuals' enjoinment of their physical appearance, increased self-esteem, etc.). Health is a quadratic function in weight-that is too low or too high levels of weight are not desired. Weight is determined by the difference between calories intake and the level of physical activity one chooses. The model is described below:

$$Max\ U = U(\emptyset_0 H_0, \quad \emptyset_1 H_1, \quad \dots, \quad \emptyset_i H_i)$$

$H_i=H_i(BMI_i)$

BMI=BMI(C,E)

C=C(WP;X)

E=E(WP;X)

where BMI represents the weight measured as body mass index, C is the amount of calories consumed, E is the level of physical activity. The levels of calories consumed and of physical activity are determined by individual weight perceptions (WP) and a vector of all other factors that influence calories intake and exercising such as age, gender, race/ethnicity, education, SES, etc.

Weight level is a rational choice made by each individual based on the marginal benefits and marginal costs associated to an increase in weight level by one unit. Marginal benefits of adding one additional unit of weight are associated with the utility derived from consuming calories and from non-strenuous leisure time. In addition, if one's social and cultural group deems higher weight bodies as desirable, increases in weight to a certain threshold are associated with higher social/cultural acceptance. Marginal costs associated with an additional unit of weight can be divided into two categories: direct costs (increased weight is associated with negative health outcomes which directly decrease individuals' utility, and in addition impose out of pocket and opportunity costs of care), and indirect costs (there is growing evidence suggesting that heavier individuals face negative educational and labor market outcomes such as decreased GPA and lower wages). In addition, heavier individuals whose weight is higher than the threshold of what one's social and cultural group finds acceptable may face other indirect costs such as stigmatization and ridicule.

The accuracy of weight perceptions enter the utility function and the healthy weight function indirectly through their effect on calories consumed and the level of physical activity one chooses. The accuracy of weight perceptions are important determinants of healthy weight and health status. Misperceptions of weight can lead to clinically/socially undesired equilibria. For example, if overweight or obese individuals misperceive their weight as lower than it is, they lack the incentives to invest in health behaviors that will lower their weight (e.g., exercising and low caloric diet) and, as a result, their weight will continue to increase, or in the best case scenario stay unchanged. This is a prominent public health concern, as the costs of overweight and obesity are not fully internalized by individuals and a large cost burden is shifted on society. Conversely, underweight individuals who misperceive their weight as higher than it is, may

engage in health behaviors aimed at weight control like excessive exercising and dieting, which have undesired health consequences like eating disorders and poor health status (Alegria et al., 2007; Flynn and Fitzgibbon, 1998; Johnson-Taylor et al., 2008; Paeratakul et al., 2002; Salcedo et al., 2010; Stice and Shaw, 2002; Vaughan et al., 2008). These in turn, lead to direct health care costs and indirect productivity losses which are not fully internalized by the individuals.

Methods

Data

Study 1 used individual-level data from four waves (1997-2000) of the National Longitudinal Survey of Youth 1997 (NLSY97). The NLSY97 is an annual survey that follows a nationally representative cohort of youths who were aged 12-17 in the first year of the survey, 1997. It contains a large body of information on individual and household characteristics. The initial sample consisted of 17,540 person-year observations on an unbalanced panel of 4,385 adolescent females and 18,396 person-year observations on an unbalanced panel of 4,599 adolescent males. This sample was restricted to include only adolescents who were living at home and were age 18 or younger in all four waves. The sample was further restricted to include only the observations with non-missing information on all of the covariates. The final estimation sample included 7,285 person-year observations on an unbalanced panel of 2,862 adolescent females and 8,585 person-year observations on an unbalanced panel of 3,290 adolescent males in 312 different counties across the U.S.

Outcome Measures

The outcome of interest was adolescent BMI calculated as weight (in kilograms) divided by height squared (in meters). Self-reported weight and height were collected in each year of the survey.

Weight Perception Measures

Three categorical weight perception indicators, under-perceived, correctly perceived and over-perceived weight, were created as the difference between the survey respondents' perception of their weight status and their actual weight status based on clinical definitions of weight. Thus, these measures could also be conceived as measures of the accuracy of weight self-perceptions.

The answers to the question "How would you describe your weight?" present in each wave of the survey were used to create four perceived weight categories: perceived underweight (equaled 1 if "very underweight" or "slightly underweight", 0 otherwise), perceived normal (equaled 1 if "about normal", 0 otherwise), perceived overweight (equaled 1 if "slightly overweight", 0 otherwise), and perceived obese (equaled 1 if "very overweight", 0 otherwise). Actual weight categories were created for each individual based on their BMI (underweight if BMI percentile $<5^{th}$percentile; normal weight if 5^{th} percentile $\leq$BMI percentile$<85^{th}$percentile; overweight if 85^{th}percentile$\leq$BMI percentile$< 95^{th}$ percentile; obese if BMI percentile $\geq 95^{th}$ percentile). The three categorical variables for the correctness of clinical weight perceptions were then created as the difference between individuals' perceived weight and their clinical weight category. An individual was defined as having under-perceived (over-perceived) weight status if she perceived her weight status as being lighter (heavier) than her clinical weight category. In other words, individuals with under-perceived weight status misperceived themselves to be "thinner" or "skinnier" than their actual clinical weight status whereas the opposite was true for individuals with over-perceived weight status.

Control Measures

Standard controls consisted of individual and household characteristics including age, age at menarche for female adolescents, youth's income (including allowance and wages), hours per week worked by youth, living arrangements (living with both or just one parent), and mother's working status (working full-time, part-time, or not working), which were obtained from the youth reports in all waves of the survey and were included in all the analyses. Parental income and mothers' education were used as proxies for household SES. Households were defined as low-education if the mother completed high school or less, and high-education if the mother completed more than high school. Households were classified as low-income if they belong to the bottom half of the income distribution, and as high-income if they belong to the top half of the income distribution. Information on parental income (including wages and salary, investments, child support, and social assistance) was collected each year from the parental questionnaire, and information regarding mother's education (less than high school, high school, some college and more) was obtained from both the parental questionnaire and the youth reports.

In addition, controls for economic contextual factors consisting of food prices, food availability, and physical activity outlets that may contribute to obesity were also included in all analyses. Fast food and food at home prices obtained from the Council for Community and Economic Research (CER2), formerly known as the American Chamber of Commerce Researchers Association (ACCRA), were merged with the NLSY97 by county and year. Food availability data consisted of outlet density (stores per 10,000 populations) of food stores (grocery stores and convenience stores), restaurants (fast food restaurants and full-service restaurants) and commercial physical activity-related outlets obtained from business lists created by Dun & Bradstreet (D&B). The outlet density measures were matched by county and year.

Finally, controls for median county-level household income and indicators for three types of residence (urban, suburban or rural) using data from Census 2000 merged to the NLSY97 at the county level were included.

Empirical Implementation

Analyses focused on gender and racial/ethnic subgroups were performed. The following reduced form empirical model of adolescent BMI was estimated:

$$BMI_{ist} = \beta_0 + \beta_1 WP_{it} + \beta_2 ECF_{st} + \beta_3 X_{it} + \beta_4 D_t + \varepsilon_{ist} \quad (1)$$

where WP_{it} is vector of categorical variables that measure the correctness of weight perceptions for individual i at time *t,* ECF_{st} is a vector of economic and contextual factors, including fast-food and food at home prices, the availability of restaurants (full-service and fast-food), the availability of food stores (supermarkets and convenience stores), and physical activity outlets, as well as the median household income in geographic area *s* at time *t.* X_{it} is a vector that includes youth's income and hours of work, age at menarche, parental income, mother's highest level of schooling, whether mother works part- or full-time, and urbanicity indicators. D_t is a vector of year dummy variables. β are vectors of parameters to be estimated, and ε_{ist} is the standard residual term. In addition, in the cross-section models X_{it} also included a complete set of age dummy variables.

First, a pooled cross-sectional ordinary least square (OLS) BMI model of Eq. (1) was estimated. However, if there are unobserved individual-level heterogeneity, OLS estimates might be biased and standard errors may be underestimated. In order to account for these, Eq. (1) can be re-rewritten as

$$BMI_{ist} = \beta_0 + \beta_1 WP_{it} + \beta_2 ECF_{st} + \beta_3 X_{it} + \beta_4 D_t + v_i + \mu_{ist} \quad (2)$$

where ν_i is the constant individual-level heterogeneity and μ_{ist} is the standard error term.

To account for unobserved individual-level time-constant heterogeneity, equation (2) was estimated using an individual-level fixed effect (FE) model. FE allows ν_i to be arbitrarily correlated with the independent variables and provides within person equation estimates. At the same time, the time time-constant independent variables in the vector X_{it} and the invariant individual-level heterogeneity ν_i are differenced out (Wooldridge, 2002). In sensitivity analyses, Eq. 2 was estimated using a random effects (RE) model. RE assumes that ν_i and the independent variables are uncorrelated and provides a weighted average of the between and within estimates (Wooldridge, 2002). If the RE model assumption holds the RE estimates are more efficient than the FE estimates. However, if ν_i is correlated with the independent variables, RE estimates are not consistent and FE model should be used. A Hausman test indicated (p-value<0.001) that Eq. (2) should be estimated as FE rather than RE.

However, the econometric techniques outlined above do not fully address the possible endogeneity of accuracy of the weight perceptions. In other words, it is plausible that same unobserved factors like peer effects can affect both actual weight and accuracy of weight perceptions. A second potential source for endogeneity would be the reverse causation of actual weight influencing accuracy of weight perceptions. If the accuracy of weight perceptions is endogenous then their OLS estimates will be biased and inconsistent. FE methods are superior to OLS in that will eliminate the time-unvarying unobservables correlated to both weight and weight perceptions, but not the time-varying ones, and will not address the reverse causality problem. In order to address the reverse causality problem, estimations using 1 period lags of weight perceptions are performed. However, this will not account for potential unobservables.

Ideally, in order to address possible endogeneity of accuracy of weight perceptions two stage least squares (2SLS) estimations can be used.

Two stage least squares models address endogeneity concerns by using "instruments," variables that are believed to have no direct association with the outcome. The instruments, which are exogenous, are used to predict the value of the potentially endogenous regressor. The predicted values are then used as regressor in the original estimation. The 2SLS assumes that the instruments are not correlated with the outcome, and are correlated with the potentially endogenous variable. If these assumptions hold, the estimated effect of the endogenous variable is consistent (Angrist et al., 1996; Bowden and Turkington, 1984).

Unfortunately for the purposes of this study there are very few valid instruments that can be used. Most variables that are correlated with weight perceptions are also correlated with actual weight. One potential instrument for weight perceptions can be a self-esteem measure under the strong assumption that self-esteem influences weight perceptions but not actual weight. Unfortunately, in NLSY97 such measure does not exist Another potential instrument for weight perceptions could be peer average weight under the strong assumption that the weight of one's peer group molds one's weight perceptions but does not influence one's actual weight. Unfortunately NLSY97 does not have information concerning peer weight. An alternative option would be to use the average weight of individuals residing in the same county (available from Center for Disease Control's Behavioral Risk Factor Surveillance System BRFSS) as an instrument for weight perceptions. In addition, the minority concentration in the county can be used as an additional instrument for weight perceptions. One's social and cultural group was shown to influence one's weight perceptions (Barroso et al., 2010; Kronenfeld et al., 2010). A strong assumption made here is that minority concentrations will influence one's weight

perceptions, but not one's actual weight. Finally lagged values of the potentially endogenous variable can serve as an instrument, again under the strong assumption that lagged values of the weight perceptions are uncorrelated with adolescent BMI. First stage estimation is presented below:

$$WP_{ist} = \gamma_1 AWC_{st} + \gamma_2 MC_{st} + \gamma_3 L.WP_{it} + \beta_2 ECF_{st} + \beta_3 X_{ist} + \beta_4 D_t + v_i + \zeta_{ist} \qquad (3)$$

where AWC_{st} represents average weight in the county for county s at time t, MC_{st} represents minority concentration in county s at time t, $L.WP_{it}$ represents lags of weight perceptions and the rest of the explanatory variables are the same ones used in equation (1).

All analyses were undertaken separately for females and males. Further, since differences also previously have been identified by race/ethnicity and SES, the analyses were stratified by these subgroups.

Results

Summary Statistics

Table I shows the summary statistics. The majority of adolescents correctly perceived their weight status, with 62.3% of females and 58.0% of males doing so. Males were more than twice as likely as females to under-perceive their weight status (35.3% vs. 15.9%, respectively), meaning that males more frequently perceived themselves as thinner than they were in actuality. Females were three times more likely to over-perceive their weight status than males (6.7% vs. 21.8%, respectively), meaning females more frequently perceived themselves as heavier than they were in actuality. Both of these findings are in line with previous literature that investigates the gender differences in weight misperceptions (Cachelin et al., 2002; Cohane and Pope, 2001; Damarest and Allen, 2000; McCreary and Sasse, 2000; Neumark-Sztainer et al., 2002; Wolf, 1991).

On average, adolescents were 16 years of age. Female adolescents earned on average a little less than $650 while male adolescents earn on average $760. Approximately 27% and 24% of female and male adolescents lived in single parent households, and the majority of female and male adolescents resided in urban areas. The majority of adolescent households had mothers employed full time for both female (61.3%) and male (62.2%) adolescents.

On average total parental income was over $33,000 for both female and male adolescents ($1998-84 adjusted $) and close to half of adolescents' mothers completed more than high school (49.9% for females and 48.1% for males).

On average, both females and males adolescents faced similar fast food ($2.8) and food at home ($1.1) prices and resided in neighborhoods with similar average concentrations of fast food (2.5) and full service (10.9) restaurants, as well as grocery (4.0) and convenience (2.0) stores.

Table I: Summary Statistics: Means (SD) and Frequencies

	Females	Males
Outcome Measure		
Body Mass Index	22.2 (4.6)	22.9[1] (4.7)
Weight Perception Measures		
Under-Perceived Weight Status	15.9%	35.3[1]%
Correctly-Perceived Weight Status	62.3%	58.0[1]%
Over-Perceived Weight Status	21.8%	6.7[1]%
Individual and Household Characteristics		
Age in Years	15.8 (1.9)	15.7 (1.9)
Age of Menarche	12.1 (1.6)	-
Youth Income	643.8 (1433.0)	760.5[1] (1,684.0)
Hours per Week Worked by Youth	11.3 (15.6)	13.4[1] (17.6)
Youth Lives With One Biological Parent	27.4%	24.2[1]%
Mother Does Not Work	20.0%	20.7%
Mother Works Part Time	18.7%	17.1[1]%
Mother Works Full Time	61.3%	62.2%
Urban Residence	68.7%	69.0%
Suburban Residence	10.4%	11.7%
Rural Residence	20.9%	19.3[1]%
Parental Socio-Economic Status		
Parental Income ($1982-84)	33,451 (34,677)	33,702 (35,253)
Mother Not Completed High School	15.0%	15.5%
Mother Completed High School	35.1%	36.4%
Mother Completed More than High School	49.9%	48.1%
Neighborhood Food, Physical Activity, and Socio-Economic Contextual Factors		
Price of Fast Food	2.8 (0.2)	2.8 (0.2)
Price of Food at Home	1.1 (0.1)	1.1 (0.1)
Fast Food Restaurants (per 10,000 capita)	2.5 (1.0)	2.5 (1.0)
Full-Service Restaurants (per 10,000 capita)	10.9 (3.5)	10.9 (3.4)
Grocery Stores (per 10,000 capita)	4.0 (2.1)	3.9[1] (2.0)
Convenience Stores (per 10,000 capita)	2.0 (1.4)	2.0 (1.3)
Physical Activity Outlets (per 10,000 capita)	3.7 (1.5)	3.7 (1.5)
County Level Median Household Income ($2000)	43,057 (11,947)	42,488[1] (10,901)
N	7,285	8,585

Note: Summary statistics are weighted using the NLSY sampling weights. [1] Statistically significantly different than females at $p<0.05$.

Table II shows the prevalence of weight under-perception by gender, race/ethnicity, and SES. There was a significant SES gradient for adolescent females, with low-SES female adolescents being more likely to under perceive their weight as compared to their high-SES counterparts. In particular, 17.0% and 19.2% of adolescent females from low-education and low-income households, respectively, under-perceived their weight status when compared to 14.9% and 13.7% of their counterparts from high-education and high-income households, respectively. For adolescent males, significant differences in weight under-perception prevalence were found only across income, with 37.5% males from low-income households under-perceiving their weight as compared to 33.5% of adolescent males from high-income households.

Turning to weight over-perceptions, results show that adolescent females from high-SES households were significantly more likely to perceive their weight as higher when compared to their low-SES counterparts (23.5% and 23.2% high-education, high income over-perceiver girls versus 20.1% and 19.8% low-education, low income over-perceiver girls, respectively). No significant differences across SES levels in weight over-perceptions were found for male adolescents.

Analyses stratified by racial/ethnic subgroups showed that among adolescent females, approximately twice as many black (27.5%) and close to ten percent more Hispanic (15.0%) adolescent females under-perceived their weight status as compared to their white counterparts (13.8%). No significant racial/ethnic differences in weight under-perception were found for adolescent males. A reverse pattern of results was found for adolescent female over-perception prevalence, with 85% more white (24.6%) and 57% more Hispanic adolescent females (20.9%) over perceiving their weight status as compared to their black counterparts (13.3%). For adolescent males, approximately 79% more white and Hispanic youths (7.0% and 7.1% white

and Hispanic male adolescents, respectively) over perceived their weight as compared to their black counterparts (3.9%).

Examining the differences in weight under-perception across race/ethnicity and SES, significantly more black adolescents from all SES levels under-perceived their weight when compared to their white and Hispanic counterparts from the corresponding SES levels. High education appeared to offer a protective effect for minority females as evidenced by significantly more black and Hispanic adolescent females from low-education households under perceiving their weight as compared to their same gender and race/ethnicity counterparts from high-education households. A similar pattern was found for Hispanic adolescent males from high-education households. Income offered a protective effect against weight under-perceptions for white adolescents, both female (15.6% vs. 12.9% for low- vs. high-income, respectively) and male (36.4% vs. 33.2% for low- vs. high-income, respectively). Income's protective effect was less consistent for minorities, with more adolescents from low-income households under perceiving their weight as compared to their high-income counterparts only for black adolescent females (29.2% vs. 23.2% low- vs. high-income, respectively) and Hispanic adolescent males (38.0% vs. 32.4% low- vs. high-income, respectively). No significant SES differences in weight under-perception were found for black adolescent males.

Turning to differences in weight over-perception across race/ethnicity and SES, significantly fewer black adolescents from all SES levels over perceived their weight when compared to their white counterparts from the corresponding SES levels. In addition, significantly more black adolescent females from high-SES households misperceived their weight as higher when compared to their low-SES counterparts. Combined with the fact that significantly fewer high-SES black adolescent females misperceived their weight as lower when

compared to their low-SES counterparts, this may suggest that high-SES black adolescent females adopt more of the Western culture beliefs regarding the thin body ideal than do their low-SES counterparts. No significant race/ethnicity and SES subgroup differences were found for the prevalence of weight over-perceptions among adolescent males.

Table II: Summary Statistics: Weight Misperceptions by Subgroups - Means (Standard Deviations) and Frequencies

	Adolescent Females				Adolescent Males			
	BMI	Under-Perceived	Over-Perceived	N	BMI	Under-Perceived	Over-Perceived	N
Full Sample	22.2 (4.6)	15.9%	21.8%	7,285	22.9 (4.7)	35.3%	6.67%	8,585
By Education								
High School or Less	22.5 (5.0)	17.0%	20.1%	4,057	23.2 (4.9)	36.0%	6.1%	4,838
Some College or More	21.8[1] (4.3)	14.9%[1]	23.5%[1]	3,228	22.6[1] (4.4)	34.5%	7.2%	3,747
By Income								
Bottom Half Income	23.0 (5.4)	19.2%	19.8%	3,602	23.3 (5.2)	37.9%	6.1%	4,170
Top Half Income	21.6[2] (4.0)	13.7%[2]	23.2%[2]	3,683	22.7[2] (4.3)	33.5%[2]	7.1%	4,415
By Race								
White	21.8 (4.1)	13.8%	24.6%	3,953	22.7 (4.3)	34.2%	7.0%	4,947
Black	23.9[a,b] (5.6)	27.5%[a,b]	13.3%[a,b]	1,871	23.7 (5.1)	40.4%	3.9%[a,b]	2,020
Hispanic	22.6[a] (4.8)	15.0%[a]	20.9%[a]	1,461	23.6 (5.2)	35.9%	7.1%	1,618
By Education and Race								
White Low-education	22.0 (4.3)	13.3%	22.4%	1,755	23.0 (4.4)	34.1%	6.6%	2,312
White High-education	21.6[1] (4.0)	14.1%	24.1%	2,198	22.4[1] (4.4)	34.4%	7.6%	2,635
Black Low-education	23.9[a,b] (5.8)	30.9%[a,b]	11.9%[a,b]	1,206	23.5[a] (5.0)	41.4%[a,b]	3.4%[a,b]	1,293
Black High-education	23.9[a,b] (5.1)	22.2%[a,b,1]	17.8%[a,b,1]	665	24.0[a,b,1] (5.2)	38.7%[a,b]	4.9%[a]	727
Hispanic Low-education	22.9[a] (5.2)	16.4%[a]	20.1%	1,096	23.9[a] (5.4)	38.5%[a]	7.2%	1,233
Hispanic High-education	21.7[1] (3.5)	11.4%[1]	25.6%	365	23.0[a,1] (4.5)	28.9%[a,1]	6.5%	385
By Income and Race								
White Low-income	22.5 (4.7)	15.6%	22.7%	1,219	23.0 (4.7)	36.4%	6.6%	1,607
White High-income	21.4[2] (3.8)	12.9%[2]	23.6%	2,734	22.5[2] (4.1)	33.2%[2]	7.4%	3,340
Black Low-income	24.1[a,b] (5.9)	29.2%[a,b]	12.9%[a,b]	1,392	23.6[a] (5.1)	41.4%[a,b]	3.7%[a,b]	1,470
Black High-income	23.2[a,b,2] (4.6)	23.3%[a,b,2]	17.5%[a,b,2]	479	23.9[a,b] (5.3)	38.0%[a,b]	4.5%[a]	550
Hispanic Low-income	22.9 (4.9)	16.0%	20.7%	991	23.9[a] (5.6)	38.0%	7.8%	1,093
Hispanic High-income	22.1[a,2] (4.5)	13.2%	23.4%	470	23.3[a,2] (4.6)	32.4%[2]	5.8%	525

Note: Summary statistics are weighted using the NLSY sampling weights. [a] Statistically different than whites at $p < 0.05$; [b] Statistically different than Hispanics at $p < 0.05$. [1] Statistically different than high school or less at $p < 0.05$; [2] Statistically different than bottom half income at $P < 0.05$.

Regression Results

Table III shows the estimated associations of weight misperceptions with adolescent BMI from OLS, OLS with 1-period lagged weight perceptions, RE, FE, and individual Fixed Effects Two Stage Least Squares (FE 2SLS) models. To enable comparison across models all analyses were performed on the smallest sample among different models, which was the sample for OLS with 1-lag weight perceptions. For all but one model, weight under-perceptions were positive and significantly associated with female and male adolescent BMI. The one exception was found in FE 2SLS Model 1 where males showed the standard relationship, but no significant relationship was found for females. In the OLS model, female adolescents who under-perceived their weight had 1.8 higher BMI units than those who correctly identified their weight, whereas males adolescents who under-perceived their weight had 2.7 higher BMI units than their counterparts. Examining 1-period lag weight perceptions rather than the contemporaneous measures, the estimated magnitude of weight under-perception decreased to 1.0 and 2.0, for female and male adolescents, respectively. A sharp decrease in the estimated coefficients was also found in the FE model, possibly because time-constant unobserved heterogeneity was accounted for. The FE model estimated that under-perception was associated with 0.7 and 0.9 higher BMI for female and male adolescents, respectively. The instrumental variable approach showed that under perceptions of weight lead to approximately 1.1 and 0.7 increased BMI for female and male adolescents, respectively.

Turning to weight over-perceptions, the OLS results suggest that there is no significant relationship between weight over-perceptions and adolescent BMI. The one period lag perception models suggest that there is a positive association between over perceptions of weight and female adolescent BMI. These results are in line with Cuypers and colleagues (2012)

findings that past over- perceptions lead to current increases in BMI. However, when time unvarying unobservables were accounted for by the FE model, the relationship between weight over-perceptions and BMI became negative. Female adolescents that over-perceive their weight, had on average, 0.4 lower BMI units than their counterparts that correctly identified their weight. Male adolescents who over-perceived their weight had 1 lower BMI unit than their counterparts who correctly identified their weight. The instrumental variable approach showed no significant relationship between weight over-perceptions and adolescent BMI.

Table III: Estimated Effects of Under-Perceived and Over-Perceived Weight Statuses on Adolescent Body Mass Index—Model Specification

	Female Adolescents (N=4,616)	Male Adolescents (N=5,591)
Ordinary Least Squares		
Under-perceived Weight	1.831*** (0.293)	2.680*** (0.174)
Over-perceived Weight	0.130 (0.138)	-0.237 (0.191)
Ordinary Least Squares Lag 1		
Under-perceived Weight	1.048*** (0.252)	1.992***(0.174)
Over-perceived Weight	0.426*** (0.155)	0.298 (0.207)
Random Effects		
Under-perceived Weight	1.178*** (0.146)	1.315*** (0.092)
Over-perceived Weight	-0.355*** (0.091)	-0.756*** (0.129)
Fixed Effects		
Under-perceived Weight	0.707*** (0.145)	0.917*** (0.099)
Over-perceived Weight	-0.361*** (0.102)	-0.991*** (0.131)
Fixed Effects Two Stage Lest Squares Model 1[1]		
Under-perceived Weight	3.143 (4.891)	4.088** (1.745)
Over-perceived Weight	-2.117 (2.026)	1.516 (4.109)
Fixed Effects Two Stage Lest Squares Model 2[2]		
Under-perceived Weight	1.142** (0.457)	0.664** (0.306)
Over-perceived Weight	-0.499 (0.354)	-0.203 (0.512)
Fixed Effects Two Stage Lest Squares Model 3[3]		
Under-perceived Weight	1.050** (0.434)	0.750** (0.366)
Over-perceived Weight	-0.273 (0.415)	-0.163 (0.570)

Note: All regressions include year trends and all of the controls listed in Table 1.In addition, all models control for a dummy variable indicator of the quality of the price match, and all models except for FE include age dummies. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering within counties. [1] Instruments used for over-perceived weight status and for under-perceived weight status are: percentage of blacks and Hispanics in one's county of residence as well as rates of average female weight status (underweight, overweight, obese) present in one's county and rates of average male weight status (underweight, overweight, obese) present in one's county for females and males, respectively. [2] Instruments used are 1 period lagged values of under-perceived and over-perceived weight status. [3] Instruments used are those listed for Models 1 and 2 together. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Model Specification.

Of the models tested, the FE 2SLS models are the most suitable to address the potential endogeneity of weight misperceptions, assuming that the chosen instruments are appropriate. Table IV presents the results for three FE 2SLS models. Model 1 used the concentration of minorities in the participant's county (expressed as percentage of population) as well as average female and male underweight, overweight, and obesity rates in the participant's county as instruments for female and male weight perceptions, respectively. The F-test statistics showed that these instruments were very weak (F=0.2 and F=0.7 for females and males, respectively). Furthermore, the null hypothesis "weight misperceptions are exogenous" of the exogeneity test (p=0.9 and p=0.1 for females and males, respectively) could not be rejected. Overidentification tests showed that taken together, the instruments were un-correlated with the error term in the second stage (p=0.5 and p =0.8 for females and males, respectively). Overall, the instruments used in this model were weak, and therefore results from this model need to be interpreted with caution.

Model 2 used 1-periood lagged weight misperceptions to instrument for the contemporaneous misperceptions. These instruments addressed the reverse-causality problem, and to the extent that lags of weight misperceptions were uncorrelated with current BMI, the instruments addressed the unobserved heterogeneity problem as well. F-test statistics (F=72 and F=105.7 for females and males samples, respectively) showed that these were strong instruments. Because Model 2 was exactly identified, an overidentification test could not be performed. However, the weak identification test of Kleibergen-Paaprk (null hypothesis: equation is weakly identified) was rejected with p=0.000. This suggests that the instruments were

Table IV: Individual Fixed Effects Two Least Squares

	Females			Males		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Under-Perceived Weight Status	3.14 (4.89)	1.14** (0.46)	1.05** (0.43)	4.09** (1.75)	0.66**(0.31)	0.75** (0.37)
Over-Perceived Weight Status	-2.12 (2.03)	-0.50 (0.35)	-0.27 (0.42)	1.52 (4.11)	-0.20 (0.51)	-0.16 (0.57)
Youth income[a]	-0.20 (0.44)	-0.29 (0.27)	-0.32 (0.35)	0.12 (0.31)	0.011 (0.24)	0.07 (0.29)
Hours of work per week	-0.005 (0.01)	-0.002 (0.003)	-0.003 (0.004)	-0.003 (0.003)	0.0002 (0.002)	-0.002(0.003)
Mother works part time	-0.16 (0.17)	0.01 (0.15)	-0.07 (0.18)	-0.03 (0.18)	-0.05 (0.15)	-0.16 (0.19)
Mother works full time	-0.19 (0.14)	-0.10 (0.15)	-0.23 (0.17)	-0.25 (0.19)	-0.29* (0.15)	-0.44** (0.21)
Youth lives with 1 parent	-0.07 (0.31)	-0.16 (0.23)	-0.02 (0.29)	0.36* (0.22)	0.07 (0.18)	0.22 (0.21)
Parental income[a]	-0.01 (0.02)	0.001 (0.01)	-0.02 (0.01)	0.03 (0.02)	-0.001 (0.01)	-0.002 (0.02)
Mother completed high school	-0.14 (1.02)	-1.17** (0.58)	-1.47** (0.72)	-0.01 (0.59)	-0.87 (0.94)	-1.00 (1.02)
Mother completed more than high school	0.15 (1.00)	-0.75 (0.59)	-0.92 (0.71)	0.67 (0.60)	-0.23 (0.98)	-0.18 (1.05)
Suburban residence	0.44 (1.63)	-0.07 (0.64)	1.15 (0.72)	-0.52 (1.01)	-1.36 (1.13)	-2.15***(0.72)
Rural residence	-0.25 (2.07)	0.29 (0.59)	0.85 (0.96)	-0.64 (0.51)	-0.47 (0.38)	-0.22 (0.58)
Price of fast food	0.08 (0.58)	-0.17 (0.53)	0.03 (0.61)	-0.45 (0.71)	0.26 (0.50)	0.15 (0.61)
Price of food at home	-1.32 (1.10)	-0.77 (0.80)	-1.18 (0.93)	-1.17 (1.01)	-0.32 (0.87)	-0.76 (1.04)
Number[b] of fast food restaurants	-0.19 (0.22)	0.09 (0.11)	0.24 (0.23)	-0.04 (0.26)	-0.15 (0.11)	0.02 (0.23)
Number[b] of non fast food restaurants	-0.12 (0.10)	-0.03 (0.06)	-0.15* (0.09)	0.05 (0.05)	-0.03 (0.04)	-0.03 (0.05)
Number[b] of grocery stores	0.04 (0.15)	0.01 (0.07)	0.04 (0.15)	-0.16 (0.15)	0.003 (0.06)	-0.04 (0.18)
Number[b] of convenience stores	0.06 (0.27)	-0.27** (0.13)	-0.29 (0.21)	0.02 (0.25)	0.22** (0.10)	-0.28 (0.34)
Number[b] of total physical activity facilities	0.21 (0.19)	-0.05 (0.14)	0.39* (0.20)	-0.22 (0.17)	0.01 (0.11)	-0.08 (0.17)
Median household income[c]	-0.14 (0.16)	-0.06 (0.21)	-0.21 (0.19)	0.54* (0.28)	0.20 (0.23)	0.43 (0.35)
Observations	4,461	3,773	2,577	5,211	4,627	3,086
F-test statistics	0.2	72.0	14.8	0.7	105.7	16.7
Exogeneity test	0.3	0.6	0.5	5.0	2.3	1.4
p-value exogeneity test	0.9	0.7	0.8	0.1	0.3	0.5
Overidentification test (Hansen J)	4.5	0.0	2.8	2.6	0.0	6.4
p-value overidentification test	0.5		0.9	0.8		0.5

Note: All regressions include a set of year fixed effects, and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering within individuals.*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. a In ten thousands of $1982-1984; b Per 10,000 capita; c In ten thousands of $2000. Instruments used for over-perceived weight status and for under-perceived weight status in Model 1 are percentage of black and Hispanics in one's county of residence as well as rates of average female weight status (underweight, overweight, obese) present in one's county and rates of average male weight status (underweight, overweight, obese) present in one's county for females and males, respectively. Instruments used in Model 2 are 1 period lagged values of under-perceived and over-perceived weight status. Instruments used in Model 3 are those listed for Models 1 and 2 together.

strong. However, like for Model 1, the null hypothesis of the exogeneity test could not be rejected.

Model 3 used both average county estimates and lagged misperceptions estimates. The F statistics showed that the instruments were strong (F=14.8 and F=16.7 for female and male sample, respectively). However given that the average county estimates were shown to be weak instruments (in Model 1) this finding should be interpreted with caution. The exogeneity test (p=0.8 and p=0.5 for females and males, respectively) suggested that the null hypothesis of misperception variables being exogenous could not be rejected. The overidentification test showed that taken together, the instruments were un-correlated with the error term in the second stage (p=0.9 and p =0.5 for females and males, respectively).

Overall, the exogeneity test could not reject the null hypothesis that weight misperceptions were exogenous variables in any of the three models. In addition although one period lagged misperceptions were highly correlated with contemporaneous misperceptions, the assumption that they were un-correlated with contemporaneous BMI may not be valid. Finding a valid instrument for misperceptions that was uncorrelated with the outcome variable (BMI) was not possible in this dataset. Thus, the validity of the results from the FE 2SLS models is uncertain.

The OLS model is biased as it controls for neither reverse causality nor individual-level unobserved heterogeneity. OLS models with one period lags misperceptions do account for reverse causality, but not for individual-level unobserved heterogeneity. Individual level FE models account for time constant individual level unobserved heterogeneity, but not for reverse causality. Thus, results from both types of models were estimated. Results from both models were similar in direction, with the estimates from the individual FE model typically being

smaller in magnitude. As a result, the remainder of this chapter will focus on the discussion from the individual-level FE models which had more conservative estimates.

Regression Results: Individual Level FE

Table V shows the results for the full set of covariates from the individual level FE model analyses. Weight under-perceptions were associated with 0.8 and 1.0 lower BMI units for female and male adolescents, respectively. Weight over-perceptions were associated with 0.4 and 0.9 lower BMI units for female and male adolescents, respectively. For female adolescents, fast food prices and number of non-fast food restaurants were negatively associated with BMI. These findings are in line with the previous literature (see Auld and Powell, 2009; Chou et al., 2008; Powell, 2009). For male adolescents, living in suburban or rural areas had a protective effect. For both female and male adolescents, increased number of physical activity outlets was associated with decreased BMI.

Table V: Individual-level Fixed Effects Estimates of Body Mass Index—Full Sample

	Females	Males
Under-Perceived Weight Status	0.845*** (0.118)	0.988*** (0.077)
Over-Perceived Weight Status	-0.399*** (0.099)	-0.908*** (0.131)
Youth income[a]	-0.099 (0.207)	-0.252 (0.176)
Hours of work per week	-0.003 (0.003)	-0.001 (0.002)
Mother works part time	-0.196* (0.115)	-0.079 (0.100)
Mother works full time	-0.168 (0.105)	0.096 (0.109)
Youth lives with one parent	-0.178 (0.150)	0.184 (0.147)
Parental income[a]	0.009 (0.11)	0.008 (0.012)
Mother completed high school	-0.486 (0.470)	-0.188 (0.396)
Mother completed more than high school	0.085 (0.388)	0.400 (0.391)
Suburban residence	0.441 (0.299)	-0.552* (0.332)
Rural residence	0.223 (0.346)	-0.494** (0.223)
Price of fast food	-0.331 (0.345)	-0.363 (0.351)
Price of food at home	-0.963 (0.740)	-0.768 (0.643)
Number[b] of fast food restaurants	0.152** (0.070)	-0.009 (0.077)
Number[b] of non fast food restaurants	-0.051* (0.027)	0.016 (0.021)
Number[b] of grocery stores	0.108 (0.077)	0.012 (0.038)
Number[b] of convenience stores	-0.077 (0.078)	0.113 (0.090)
Number[b] of total physical activity facilities	-0.091* (0.051)	-0.162** (0.063)
Median household income[c]	-0.049 (0.103)	0.119 (0.125)
N	7,285	8,585

Note: All regressions include a set of year fixed effects, and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering within individuals.*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. a In ten thousands of $1982-1984; b Per 10,000 capita; c In ten thousands of $2000.

Table VI shows the regression estimates for the FE models by gender, race/ethnicity and SES. Looking at the relationship between weight under-perceptions and adolescent BMI weight

under-perception was positively and significantly associated with adolescent BMI, excepting the Hispanic adolescents from high-income households. Analyses stratified by SES showed significantly lower magnitude of association for adolescent males belonging to high-income households (0.6 higher BMI units) when compared to their counterparts from low-income households (1.4 higher BMI units). No SES differences were found for adolescent females in the FE models. Analyses stratified by race showed significantly higher estimates for adolescent black females (1.5 higher BMI units) compared to their white counterparts (0.6 higher BMI units). No significant racial differences in the magnitude of the estimates were found for adolescent males.

However, when racial/ethnic differences by SES were examined, different patterns emerged. Among females, black adolescents from high-education and low-income households had significantly higher magnitudes of association of weight under-perception and BMI (1.5 and 1.7 higher BMI units, respectively) than their white counterparts (0.5 and 0.6 higher BMI units for white females from high-education and low-income households, respectively). Among males, there was an income gradient with white and Hispanic adolescents from high- income households having significantly lower magnitudes of associations (0.6 and 0.3 higher BMI units, respectively) than their counterparts from low-income households (1.3 and 1.5 higher BMI units for white and Hispanic adolescents, respectively). In addition, black adolescent males from high-SES households (as measured by mother's education and family income) had significantly higher estimates than their white counterparts (1.4 and 1.4 higher BMI units for black adolescents from high education and high income households respectively, versus 0.8 and 0.6 higher BMI units for white adolescents from high-education and high-income households, respectively).

Turning to the relationship between weight over-perceptions and adolescent BMI, the results showed that the two were negatively associated for most subgroups. In other words, adolescents who thought they were heavier than they were in actuality tended to be thinner than their counterparts who correctly indentified their own weight. For female adolescents there was no significant association between weight over-perceptions and BMI for the following subgroups: high-education blacks and Hispanics, high-income whites, and low-income Hispanics. For males, no significant association was found for high-SES Hispanics.

Analyses stratified by SES showed no significant differences in the magnitude of association between weight over-perceptions and adolescent BMI for either females or males. Analyses stratified by race showed significantly higher estimates in absolute value for adolescent black females (0.8 BMI units) and for Hispanic males (1.6 BMI units) compared to their white counterparts (0.3 and 0.8 BMI units for white females and males, respectively).

Racial/ethnic differences by SES showed that among females, black adolescents from low-education households had significantly higher magnitudes of association in the absolute value of weight over-perception and BMI (1.4 BMI units) than their white counterparts (0.5 BMI units). Among males, Hispanic adolescents from low-SES households had significantly higher magnitudes of associations in absolute value (2.0 and 2.2 BMI units, for males from low-education and low-income households, respectively) than their white counterparts from low-SES households (0.6 and 0.8 BMI units for white adolescents from low-education, low-income households, respectively).

Table VI: Individual-level Fixed Effects Estimates of Adolescent Female Body Mass Index: Full Sample and by Subgroups

	Females			Males		
	Under-Perceived	Over-Perceived	N	Under-Perceived	Over-Perceived	N
Full Sample	0.845*** (0.118)	-0.399*** (0.099)	7,285	0.988*** (0.077)	-0.908*** (0.131)	8,585
By Education						
High School or Less	1.004*** (0.160)	-0.619*** (0.148)	4,057	1.080*** (0.113)	-0.948*** (0.212)	4,838
Some College or More	0.660*** (0.163)	-0.251** (0.119)	3,228	0.876*** (0.113)	-0.928*** (0.169)	3,747
By Income						
Bottom Half Income	1.117*** (0.185)	-0.628*** (0.167)	3,602	1.368*** (0.141)	-1.235*** (0.294)	4,170
Top Half Income	0.668*** (0.163)	-0.261** (0.128)	3,683	0.631***[2] (0.095)	-0.775*** (0.146)	4,415
By Race						
White	0.624*** (0.137)	-0.307*** (0.113)	3,953	0.902*** (0.087)	-0.776*** (0.148)	4,947
Black	1.497***[a] (0.254)	-0.846***[a] (0.285)	1,871	1.314*** (0.189)	-1.102*** (0.300)	2,020
Hispanic	0.956*** (0.257)	-0.550** (0.258)	1,461	1.144*** (0.180)	-1.643***[a] (0.402)	1,618
By Education and Race						
White Low-education	0.759*** (0.195)	-0.479*** (0.181)	1,755	1.026*** (0.135)	-0.641** (0.248)	2,312
White High-education	0.515*** (0.184)	-0.225* (0.136)	2,198	0.802*** (0.119)	-0.929*** (0.187)	2,635
Black Low-education	1.519*** (0.330)	-1.442***[a] (0.420)	1,206	1.152*** (0.246)	-1.082** (0.416)	1,293
Black High-education	1.356***[a] (0.316)	-0.246[1] (0.284)	665	1.401***[a] (0.315)	-1.216*** (0.375)	727
Hispanic Low-education	0.856*** (0.312)	-0.590** (0.270)	1,096	1.142*** (0.232)	-2.028***[a] (0.516)	1,233
Hispanic High-education	1.106** (0.549)	-0.636 (0.464)	365	0.793** (0.369)	-0.521[1] (0.504)	385
By Income and Race						
White Low-income	0.554** (0.267)	-0.561** (0.244)	1,219	1.269*** (0.198)	-0.803** (0.378)	1,607
White High-income	0.622*** (0.169)	-0.192 (0.139)	2,734	0.597***[2] (0.098)	-0.764*** (0.154)	3,340
Black Low-income	1.709***[a] (0.305)	-1.005*** (0334)	1,392	1.423*** (0.310)	-1.205*** (0.382)	1,470
Black High-income	1.037** (0.446)	-0.627** (0.312)	479	1.422***[a,b] (0.309)	-1.620** (0.622)	550
Hispanic Low-income	0.919** (0.385)	-0.409 (0.294)	991	1.544*** (0.216)	-2.205***[a] (0.637)	1,093
Hispanic High-income	0.586 (0.447)	-0.765* (0.460)	470	0.391[2] (0.392)	-0.619[2] (0.530)	525

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at county level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.
[a] Statistically different than whites at $p < 0.05$; [b] Statistically different than Hispanics at $p < 0.05$. [1] Statistically different than high school or less at $p < 0.05$; [2] Statistically different than bottom half income at $p < 0.05$.

Discussion

Study 1 documented the incidence of weight perceptions in a sample of adolescents by gender, race/ethnicity, and SES. Study 1 found that more than twice as many adolescent males under-perceived their weight status, meaning they perceived themselves as thinner than they actually were, when compared to their female adolescent counterparts. This finding is in line with the previous literature that shows that adolescent and adult males were more likely to under-perceive their weight compared to their female counterparts (Brener et al., 2004; Cohane and Pope, 2001; Viner et al., 2006). However, this finding needs to be interpreted with caution, given that BMI does not account for the proportion of muscle mass relative to adipose tissue. It may be the case that muscular teens correctly identify their weight as normal, but their BMI falls within the overweight category. In this case, although correct in their perceptions of normal weight, muscular men would be mistakenly classified as under-perceivers, and therefore the estimated incidence of male weight under-perception would be upward-biased. More precise measures of weight that take into account the muscle to adipose tissue proportion will improve current estimates of weight under-perceptions incidence among males (and among athletic females).

In contrast, approximately four times more female adolescents over-perceived their weight, that is, they believe that were heavier than clinically defined when compared to their male counterparts. This finding is in line with the literature documenting gender differences in weight perceptions, with females ascribing to the thin ideal body emphasized in the media, and males ascribing to “bigger”, more muscular body ideals.

The descriptive analysis found that fewer adolescents from high-income households under-perceived their weight as compared to their counterparts from low-income households. In

addition, fewer adolescent females, but not males, from high-education households under-perceived their weight status when compared to their counterparts from low-education households. More adolescent females from high-SES households over-perceived their weight status but no such patterned was found for men. The results suggest that belonging to a high-SES household had a protective effect against under-perceptions of weight but had a detrimental effect for over-perceptions of weight. It could be the case that higher-SES families adhere more closely to the ultra-thin western body ideal which translates to a tendency for over-perceiving one's weight.

Similar to previous findings (Dorsey et al., 2009; Kuchler and Variyam, 2003), black and Hispanic adolescent girls were more likely to under-perceive their weight status and were less likely to over-perceive their weight status when compared to their white counterparts. No differences across race/ethnicity in the prevalence of weight under-perception among males were found, but black adolescent males were less likely to over-perceive their weight than their white and Hispanic counterparts. The analyses stratified by race/ethnicity and SES revealed that mother's education was a protective factor against weight under-perception prevalence for black and Hispanic adolescent females and for Hispanic males, but not for white adolescents or for black males. Parental income was a protective factor against the prevalence of weight under-perceptions for white adolescents, black female and Hispanic male adolescents. High-SES status was associated with increased prevalence of over-perceptions of weight for black female adolescents, which suggests that this group may depart from the racially/ethnically specific beliefs about body ideals and uphold some of the western culture ideals. In addition, black adolescents from all SES sub-categories had higher weight under-perception prevalence compared to their corresponding same gender and SES white and Hispanic counterparts. In

contrast, black female adolescents from all SES subgroups had lower prevalence of weight over-perceptions than their corresponding SES sub-categories white and Hispanic counterparts. For males, low-SES black adolescents had lower prevalence of weight over-perceptions than their white and Hispanic counterparts, and high-SES black adolescents had lower prevalence of weight over-perceptions when compared to their white but not Hispanic high-SES counterparts.

Regression results showed that weight under-perception was significantly associated with higher BMI while weight over-perception was significantly associated with lower BMI for both adolescent females and males even after controlling for time-constant unobservables.

The results showed that cross-sectional studies are likely to substantially over-estimate the potential impact of weight misperceptions on body weight outcomes. Results showed that, using OLS methods, weight under-perception was associated with 1.8 and 2.7 higher BMI units for adolescent females and males, respectively. These magnitudes of associations were two and a half times larger than those obtained in the individual-level fixed effects models when accounting for time-constant unobservables (0.7 and 0.9 higher BMI units for adolescent females and males, respectively). In addition, OLS models show no significant associations between weight over-perceptions and adolescent BMI, while FE models show significant negative associations (-0.4 and -0.8 lower BMI units for female and male adolescents, respectively).

Nonetheless, the estimated effects from the FE model are non-trivial. For example, white adolescent females who under-perceived their weight had 0.6 higher BMI units, which translated into approximately 3.6 lb. (1.6 kg) higher weight for a 15-year-old adolescent female with an average height of 5’5” (1.6 m), when compared to their counterparts that correctly identified their weight status. For black adolescent females, the estimates showed that weight under-perception was associated with 1.5 higher BMI units which corresponded to 9.0 lb. (4.1 kg)

higher weight for an average height of 5’5” (1.6m), 15–years-old adolescent. Although for both categories weight under-perception had a detrimental impact on weight, the impact was more marked (by approximately 5 extra pounds) for black adolescent females. This white-black significant difference in the magnitude of association between weight under-perception and BMI for female adolescents, combined with the fact that, on average, black teens were more likely to under-perceive their weight status, shows that weight under-perception is particularly important for understanding the current racial/ethnic weight trends and weight disparities for females. This current longitudinal analysis showed that not only do black female teens misperceive their weight status to a greater extent but that the association with body weight was even more detrimental than it was for their white teen counterparts, suggesting that cultural-specific policy interventions need to be considered.

Turning to the over perceptions of weight, results showed that for a white female adolescent, 15 years of age and average height of 5’5”, weight over-perceptions were associated with 0.3 lower BMI units which translates to 1.9 fewer pounds. For a similar black female adolescent, weight over-perceptions were associated with 0.8 lower BMI units which translate to approximately 5.0 fewer pounds. Although for both adolescents over-perceptions of weight were associated with decreased weight, the results were more marked for black adolescents. These results suggest that for black adolescent females weight misperceptions, regardless of their type, have more severe weight impact than they do for their white counterparts.

Regression analyses stratified by SES showed an income gradient for males, but not for females, with significantly higher magnitudes of associations between weight under-perceptions and BMI for low-income male adolescents as compared to their high-income counterparts. This suggests that income might be a protective factor for the effect of weight under-perception on

BMI for men. Further stratifications by race/ethnicity and SES showed that the income gradient remained consistent for white and Hispanic but not for black male adolescents.

Although this is the first study to use longitudinal methods to examine the association between weight misperceptions and BMI, it has several limitations. First, the potential endogeneity from the existence of time-varying unobservables was not addressed in the FE models and the FE 2SLS models suffered from instruments that were either weak or not fully un-correlated with the outcome variable. Therefore, the results need to be interpreted with caution. Second, height and weight were self-reported. A number of previous studies starting with Cawley (2004) tried to adjust self-reported height and weight for potential measurement errors using NHANES III (1988-1994). Giving that individuals participating in the NHANES were aware that their weight and height will be measured, the size of the error in their self-reported height and weight may be different than those in NLSY97. Thus, such adjustments may introduce a new set of errors (Han et al. 2009; U.S. Department of Health and Human Services, 1996). Third, the sample sizes for subgroups were relatively small; therefore, some of the analyses may have lacked the statistical power to identify significant relationships. Fourth, studies showed that BMI is an imperfect measure that does not account for the muscle mass – adipose tissue ratio, and therefore the results may be over-estimated if a large proportion of muscular adolescents were present in the estimation sample.

Despite these limitations, the study findings suggest that weight under-perception is a potentially important risk factor for the development of adolescent obesity. Weight over-perceptions, to the extent to which adolescents who over-perceive their weight are actually underweight, could be a potential threat to one's health if these adolescents engage extensively in weight control mechanisms, develop eating disorders, and lose weight to life-threatening levels.

School programs aimed at correct weight identification and interpretation may be an invaluable tool in addressing the obesity crisis and may help prevent the development of certain eating disorders.

There is evidence that peers' and caregivers' weight status have an influence on individual adolescent weight perceptions. Two recent studies found that children and adolescents who are exposed to overweight or obese peers and caregivers are more likely to under-perceive their weight compared to their counterparts exposed to normal-weight peers and caregivers (Ali et al., 2011; Maximova et al., 2008). Therefore, public health programs aimed at educating children and adolescents about correctly identifying one's weight status may have spillover effects, contributing not only to individual but also broader improvements in identification of weight status. Future research using longitudinal data or randomized intervention studies will help to further understand the impact of weight perceptions on BMI and its future trajectory among adolescent populations.

Chapter 3: Weight misperceptions and actual weight—Oaxaca decomposition

Study 2 investigates the role played by weight misperceptions in the racial/ethnic adolescent weight gap. Research estimates that 34.5% of US adolescents were overweight, and 20.5% were obese in 2011-12 (Ogden et al., 2014). Minorities were disproportionately affected with approximately 39.6%, 37.3%, and 31.5% of Hispanic, black, and white male adolescents, respectively, being overweight or obese while 36.5%, 42.5%, and 31.0% of Hispanic, black, and white female adolescents, respectively, being overweight or obese (Ogden et al., 2014). Although recent evidence suggests that the obesity prevalence reached a plateau in the past years, the weight gap between whites and other minorities persists, with approximately 26% and 18% more Hispanic and black adolescent males being overweight or obese as compared to their white counterparts and 18% and 37% more Hispanic and black adolescent females being overweight or obese as compared to their white counterparts (Ogden et al., 2014).

Most of the literature concerning the determinants of obesity focuses on the importance of socioeconomic and environmental or contextual factors (Chou et al., 2008; Auld and Powell, 2009; Powell, 2009). Socioeconomic factors like family income and parents' educational attainment (Shrewsbury and Wardle, 2008; Wang et al., 2002), as well as environmental factors like food prices, restaurant, food and physical activity outlet availability, and neighborhood income (Gordon-Larsen et al., 2006; Larson et al., 2009; Powell et al., 2006; Powell and Chaloupka, 2011) are some of the factors found to play an important role in explaining individual BMI.

Previous work on the determinants of the ethnic/racial BMI gap found that parental SES along with economic contextual variables explain most of the weight gap for adolescent males. For example, Powell and colleagues (2012) found that these variables explained 63% of the BMI

gap between black and white adolescent males and 74% of the BMI gap between Hispanic and white male adolescents. However, they found that the BMI gap for female adolescents, especially for black-white teens remains largely unexplained with only 44% and 62% explained BMI gap for black-white and Hispanic-white adolescent females, respectively.

Giving the racial/ethnic differences regarding weight perceptions and in particular weight misperceptions found in the literature (for details see Chapter 2 "Literature Review" pg 5), Study 2 of this dissertation builds on the findings from Powell and colleagues (2012) and investigates the contribution of adolescent weight misperceptions to the racial/ethnic weight gap.

Research Questions and Hypothesis

Q1: Do weight misperceptions explain some of the racial/ethnic weight gap for adolescents?

Q2: Are weight misperceptions more important in explaining the gap existent between black and white adolescents as compared to the gap between Hispanic and white adolescents?

Q3: Are these differences present for both genders?

H1: Weight perceptions will significantly contribute to the explained part of the black-white and Hispanic-white adolescent BMI gap.

Methods

Data

This study used individual-level data from the NLSY97. First four waves of the survey (1997-2000) were used. The initial sample consisted of 17,540 person-year observations on an unbalanced panel of 4,385 adolescent females and 18,396 person-year observations on an unbalanced panel of 4,599 adolescent males. In order to be able to match the price data to the NLSY97 data, the sample was restricted to adolescents that lived in the same or contiguous

counties for which price matches were available. In addition, the estimation sample was restricted to include only observations with non-missing information on all of the covariates examined in the study. Final estimation sample included 5,035 and 5,922 person-year observations on an unbalanced panel of 2,134 and 2,659 female and male adolescents, respectively, living in 312 different counties across the U.S.

Outcome Measures

The outcomes of interest were the ethnic disparities in BMI between non-Hispanic black (hereafter referred to as black) and non-Hispanic white (hereafter referred to as white) adolescent females (black-white) and between Hispanic and white adolescent females (Hispanic-white). BMI was calculated as weight (in kilograms) divided by height squared (in meters) using self-reported weight and height collected in each year of the survey.

Weight Misperception Measure

Indicators for weight misperceptions (under-perceived weight, correctly perceived weight, and over-perceived weight) were constructed as the difference between the survey respondents' perception of their weight status and their actual weight status based on clinical definitions of weight. For details, see Chapter 2 pg. 17.

Controls Measures

Standard individual and household characteristics including age, age of menarche, youth's income (including allowance and wages), hours per week worked by youth, living arrangements (living with both or just one parent), and mother's working status (working full-, part-time, or not working), which were obtained from the youth reports were used in all analyses. In addition, parental income and mothers' education were used as proxies for household SES. Information on parental income (including wages and salary, investments, child support, and

social assistance), in each wave, was collected from the parental questionnaire, and data regarding mother's education (less than high school, high school, some college and more) was obtained from both the parental questionnaire and the youth reports.

In addition, controls for a number of contextual factors that may contribute to weight disparities were used in all analyses. Measures of fast food prices and food at home prices obtained from the CER2 were matched to each wave of the NLSY97 sample at county level using the closest city match available in the CER2 data. In the analyses I kept only observations that matched the price data from the same or adjacent county. An additional categorical indicator that controlled for prices matched on same versus contiguous county was added to all the analyses. Controls for the commercial food and activity environment using outlet density measures of available food stores (supermarkets/grocery stores and convenience stores), restaurants (fast food restaurants and full-service restaurants) and commercial physical activity-related outlets obtained from business lists created by Dun & Bradstreet (D&B) were used in all analyses. The outlet density measures were matched by county and year and were defined as the number of outlets per 10,000 capita. Median county-level household income and the type of residence: urban, suburban or rural, based on Census 2000 data merged to the NLSY97 by the county-level geocode identifiers were included as controls.

Empirical Implementation

To determine the extent to which weight perceptions and their correctness explain the ethnic/racial BMI gap, an Oaxaca-Blinder decomposition analysis was performed (Blinder, 1973; Oaxaca, 1973). This methodology decomposes the observed group difference into two main components: the disparity associated with the differences in weight perceptions, demographic,

parental SES, and economic contextual determinants and the disparity associated with the differential response by ethnic groups to those factors.

The Oaxaca-Blinder decomposition is implemented in the following form:

$$\overline{\boldsymbol{BMI}}_{\boldsymbol{W}} - \overline{\boldsymbol{BMI}}_{\boldsymbol{M}} = \overline{\boldsymbol{X}}_{\boldsymbol{W}}'\widehat{\boldsymbol{\beta}}_{\boldsymbol{W}} - \overline{\boldsymbol{X}}_{\boldsymbol{M}}'\widehat{\boldsymbol{\beta}}_{\boldsymbol{M}}$$

$$= \underbrace{\left(\overline{\boldsymbol{X}}_{\boldsymbol{W}}' - \overline{\boldsymbol{X}}_{\boldsymbol{M}}'\right)\widehat{\boldsymbol{\beta}}^{*}}_{explained\ portion} + \underbrace{\overline{\boldsymbol{X}}'\left(\widehat{\boldsymbol{\beta}}_{\boldsymbol{W}} - \widehat{\boldsymbol{\beta}}_{\boldsymbol{M}}\right)}_{unexplained\ portion} \quad (4)$$

where indices W and M indicate white and minority populations, $\overline{\boldsymbol{BMI}}_{\boldsymbol{W}}$ and $\overline{\boldsymbol{BMI}}_{\boldsymbol{M}}$ are the mean BMI for the respective populations, $\overline{X}$ is the vector containing the mean of covariates, and $\widehat{\boldsymbol{\beta}}^{*}$ is the vector containing weighted average of estimated coefficients for white, $\widehat{\boldsymbol{\beta}}_{\boldsymbol{W}}$, and for minority populations, $\widehat{\boldsymbol{\beta}}_{\boldsymbol{M}}$. I followed the method proposed by Neumark (1988) which used the estimated coefficients from the pooled regression to obtain the weighted average for $\widehat{\boldsymbol{\beta}}^{*}$. The Oaxaca-Blinder decomposition decomposes the difference in BMI between two groups into those due to the group differences in means of explanatory variables and those due to the group differences in the estimated coefficients.

In Eq. (4), the first term is interpreted as the explained portion of the ethnic disparity, whereas the rest are interpreted as the unexplained portion. The explained portion is driven by the differential endowments of covariates $\boldsymbol{X}$. The unexplained portion, on the other hand, is driven by the differences in the estimated coefficients. The unexplained portion, therefore, can be interpreted as the differential response to the determinants of BMI by each ethnic group.

Results

Descriptive Statistics

Table VII shows the summary statistics by gender and race/ethnicity for BMI, weight misperceptions, individual and household characteristics, parental SES, and economic contextual factors. On average, white adolescent females had lower BMI by 2.2 units and 0.9 units compared to their black and Hispanic counterparts, respectively, while white adolescent males had lower BMI by 1.1 and 0.8 units compared to their black and Hispanic counterparts, respectively. These differences are equivalent to 13.2 lbs and 5.4 lbs difference, respectively, for an average 15-year-old female with a height of 5'5" and to 7.0 lbs and 5.1 lbs difference, respectively for an average 15-year-old male with a height of 5'6".

On average, compared to white adolescents, black adolescents were more than twice as likely (females) and 22.8% more likely (males) to under-perceive their clinical weight status, perceiving that they were lighter than they actually were, and Hispanic female adolescents were almost one quarter more likely to do so. Compared to black adolescents, white and Hispanic adolescents were more likely to over-perceive their clinical weight status thinking that they were heavier than they were. The majority of all adolescents, though to a lesser extent for blacks, correctly perceived their weight status (57.3% and 53.3% for female and male black adolescents vs. 62.2% and 57.6% for female and male white and 61.8% and 57.8% female and male Hispanic adolescents, respectively).

On average, white adolescent females experience puberty at significantly older age (12.2) than their black (11.6) and Hispanic (11.8) counterparts. More than twice as many black adolescents (50.4% females and 54.7% males) and close to 50% more Hispanic adolescents (30.1% females and 28.3% males) lived in single parent households when compared to their

white counterparts (21% females and 18.7% males). In addition, on average white adolescents lived in higher SES households (measured by total parental income and mother's education) as compared to their black and Hispanic counterparts.

Turning to neighborhood characteristics, on average black adolescents faced slightly lower fast food prices than their white and Hispanic counterparts, while Hispanic adolescents faced slightly higher prices for the food at home compared to white and black adolescents. Black adolescents lived in neighborhoods with higher concentrations of fast food restaurants, grocery stores and convenience stores and lower median household income as compared to their white and Hispanic counterparts.

Table VII: Summary Statistics: Means (Standard Deviation) and Frequencies

	Females			Males		
	White N=2,697	Black N=1,316	Hispanic N=1,022	White N=3,264	Black N=1,437	Hispanic N=1,221
Outcome Measure						
Body Mass Index	21.56 (3.81)	23.80[a] (5.57)	22.43[a,b] (4.56)	22.79 (4.45)	23.91[a] (5.31)	23.56[a] (5.03)
Weight perceptions						
Over-Perceived Weight	24.90%	14.10%[a]	22.30%[b]	7.30%	3.60%[a]	6.30%[b]
Correctly-Perceived Weight	62.20%	57.30%[a]	61.80%[b]	57.60%	53.30%[a]	57.80%[b]
Under-Perceived Weight	12.90%	28.60%[a]	15.90%[a,b]	35.10%	43.10%[a]	35.90%[b]
Individual and Household Characteristics						
Age	15.78 (1.82)	15.81 (1.85)	15.70 (1.94)	15.82 (1.87)	15.94 (2.08)	16.04[a] (1.99)
Age of Menarche	12.22 (1.51)	11.64[a] (1.69)	11.79[a,b] (1.75)	--	--	--
Youth Income	794.60 (1,554)	545.80[a] (1,176)	592.60[a] (1,854)	908.20 (1,906)	651.90[a] (9,574)	787.20(10,525)
Hours /week youth worked	12.21 (14.37)	10.82[a] (14.95)	10.19[a] (15.26)	14.02 (16.10)	12.18[a] (18.55)	14.00[b] (18.47)
Youth Lives With One Biological Parent	21.00%	50.40%[a]	30.10%[a,b]	18.70%	54.70%[a]	28.30%[a,b]
Mother Does Not Work	17.50%	21.70%[a]	26.70%[a,b]	18.50%	23.00%[a]	29.40%[a,b]
Mother Works Part Time	20.40%	11.90%[a]	16.00%[a,b]	18.10%	11.20%[a]	10.20%[a]
Mother Works Full Time	62.10%	66.40%[a]	57.30%[a,b]	63.40%	65.80%	60.40%[b]
Urban Residence	70.61%	76.96%[a]	90.00%[a,b]	72.40%	76.30%	92.90%[a,b]
Suburban Residence	9.59%	6.64%[a]	4.51%[a]	11.60%	5.30%[a]	3.40%[a,b]
Rural Residence	19.80%	16.40%[a]	5.49%[a,b]	16.00%	18.40%	3.70%[a,b]
Parental Socio-Economic Status						
Parental Income ($1982-1984)	39,357 (31885.00)	18,922[a] (25479.00)	21,450[a,b] (28114.00)	38,276 (33,024)	17,115[a] (19,496)	22,283[a,b] (26,062)
Mother Less Than High School	8.70%	18.20%[a]	37.80%[a,b]	10.00%	20.70%[a]	41.80%[a,b]
Mother Completed High School	35.90%	42.50%[a]	34.40%[b]	35.40%	40.40%[a]	31.10%[a,b]
Mother More Than High School	55.40%	39.30%[a]	27.80%[a,b]	54.60%	38.90%[a]	27.10%[a,b]

(Continued)

Table VII (Continued)

	Females			Males		
	White N=2,697	Black N=1,316	Hispanic N=1,022	White N=3,264	Black N=1,437	Hispanic N=1,221
Neighborhood Food, Physical Activity, and Socio-Economic Contextual Factors						
Price of Fast Food	2.76 (0.16)	2.74[a] (0.20)	2.84[a,b] (0.20)	2.76 (0.16)	2.75[a] (0.20)	2.82[a,b] (0.20)
Price of Food at Home	1.09 (0.10)	1.09 (0.12)	1.14[a,b] (0.17)	1.09 (0.09)	1.10[a] (0.13)	1.14[a,b] (0.17)
Fast Food Restaurants[1]	2.36 (0.82)	2.60[a] (0.86)	2.32[b] (0.63)	2.41 (0.79)	2.52[a] (0.93)	2.36[a,b] (0.62)
Full-Service Restaurants [1]	10.54 (2.93)	11.34[a] (4.48)	11.08[a] (3.25)	10.78 (2.89)	10.77 (4.20)	11.27[a,b] (3.16)
Grocery Stores[1]	3.00 (1.44)	4.14[a] (2. 55)	3.04[b] (1.78)	3.46 (1.48)	4.62[a] (2.60)	3.50[b] (1.76)
Convenience Stores[1]	1.96 (1.14)	2.48[a] (1.71)	1.52[a,b] (0.96)	1.91 (1.08)	2.41[a] (1.65)	1.53[a,b] (1.04)
Physical Activity Outlets[1]	3.68 (1.14)	3.24[a] (1.47)	2.97[a,b] (1.20)	3.84 (1.20)	3.13[a] (1.45)	2.92[a,b] (1.25)
County Level Median Household Income ($2000)	44,194 (10417.00)	39,209[a] (10020.00)	43,390[b] (12001.00)	43,441 (9678.00)	39,627[a] (9574.00)	43,021[b] (10525.00)

Notes: Summary statistics are weighted using the NLSY sampling weights. SD is standard deviation. [a]=statistically different than whites at $p \leq 0.05$; [b]=statistically different from blacks at $p \leq 0.05$. [1]= per 10,000 capita.

Weight Misperceptions by Weight Categories

Table VIII presents descriptive statistics of the weight misperceptions by actual clinical weight categories across the three racial/ethnic groups. First looking at the female adolescents, results show that except for the overweight adolescents who correctly identified their personal weight status category, there were no other statistically significant differences between white and Hispanic adolescent females. In contrast, statistically significant differences between black and white adolescent females were found for all weight status categories, except for the clinically underweight adolescents and the overweight adolescents who over-perceived their weight. For all weight status categories, white adolescents were, on average, less likely to under-perceive their actual weight status than their black counterparts. In particular, 15.0% of overweight white adolescents under-perceived their weight status compared to 44.9% of overweight black female adolescents and 59.0% of obese white adolescents under-perceived their weight compared to 72.7% of obese black female adolescents. In addition, significantly more normal weight white (26.7%) and Hispanic (24.7%) adolescents over-perceived their weight as compared to their black counterparts (17.3%).

Turning to adolescent males, results show that compared to female adolescents, fewer male adolescents over-perceived their weight and more male adolescents under-perceived their weight. In addition, much fewer overweight and obese male adolescents correctly identified their weight when compared to their female counterparts, for all racial/ethnic subgroups. In particular, only 45.6%, 19.4%., and 37.7% of the overweight and 18%, 9.7%, and 20.1% of the obese white, black, and Hispanic adolescent males, respectively, correctly identified their weight as compared to 73%, 46.6%, and 62.5% overweight and 41%, 27.3%, and 38.7% obese white, black, and Hispanic adolescent females who correctly identified their weight.

Except for three sub-groups: normal weight and overweight adolescents who correctly identify their weight status and normal weight adolescents who under-perceive their weight, there were no significant differences between white and Hispanic male adolescents. In contrast, significant differences between white and black male adolescents were found for all weight categories except for normal weight adolescents who under-perceive their weight. Larger proportions of overweight (80.1%) and obese (90.3%) black male adolescents under-perceived their weight as compared to their white (52.5% and 82% of overweight and obese, respectively) and Hispanic (58% and 79.9% of overweight and obese, respectively) counterparts. In addition, more underweight black male adolescents (56.6%) over-perceived their weight status when compared to their white counterparts (35.5%) and fewer normal weight (3.7%) and overweight (0.5%) black male adolescents over-perceived their weight status as compared to their white (8% and 1.9% normal weight and obese, respectively) and Hispanic (7% and 4.3% normal weight and overweight, respectively) counterparts.

Table VIII: Frequencies of Correctness of Weight Perceptions by Gender, Race/Ethnicity, and by Weight Categories

	Female Adolescents								
	White			Black			Hispanic		
	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Underweight	44.40%	55.60%	-	64.30%	35.70%	-	41.40%	58.60%	-
Normal Weight	26.70%	62.40%	10.90%	17.30%[a]	68.00%[a]	14.70%[a]	24.70%[b]	64.30%	11.00%[b]
Overweight	12.00%	73.00%	15.00%	8.50%	46.60%[a]	44.90%[a]	16.50%[b]	62.50%[a,b]	21.00%[b]
Obese	-	41.00%	59.00%	-	27.30%[a]	72.70%[a]	-	38.70%	61.30%
N	655	1652	345	183	739	367	222	623	159
	Male Adolescents								
	White			Black			Hispanic		
	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status	Over-Perceived Weight Status	Correctly Perceived Weight Status	Under-Perceived Weight Status
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Underweight	35.50%	64.50%	-	56.60%[a]	43.40%[a]	-	44.70%	55.30%	-
Normal Weight	8.00%[1]	67.00%[1]	25.00%[1]	3.70%[1,a]	74.00%[1,a]	22.30%[1]	7.00%[1,b]	72.70%[1,a]	20.10%[1,a]
Overweight	1.90%[1]	45.60%[1]	52.50%[1]	0.50%[1,a]	19.40%[1,a]	80.10%[1,a]	4.30%[1,b]	37.70%[1,a,b]	58.00%[1,b]
Obese	-	18.00%[1]	82.00%[1]	-	9.70%[1,a]	90.30%[1,a]	-	20.10%[1,b]	79.90%[1,b]
N	238	1880	1146	52	766	619	78	705	438

Notes: Summary statistics are weighted using the NLSY sampling weights; a=statistically different from whites at p≤0.05; b=statistically different from blacks at p≤0.05; Underweight: BMI Percentile< 5 ; Normal weight:85> BMI Percentile≥5; Overweight: 95>BMI Percentile ≥85; Obese: BMI Percentile≥95; 1=statistically different from females at p≤0.05

Decomposition Results

The contribution of weight misperceptions to the "explained" part of the racial/ethnic BMI gaps are shown in Table IX. The base model (Model 1) included the standard individual and household characteristics as well as economic contextual variables. Model 2 added the weight misperception covariates to Model 1.

The base model, Model 1, explained 44.7% and 63.3% of the black-white disparity in adolescent female and male BMI, respectively (column 1) and 62.8% and 78.3% of the Hispanic-white disparity in female and male BMI, respectively (column 3). Adding the weight misperception covariates in Model 2 raised the total explained portion of the black-white BMI disparity to 54.3% and 74.3% for females and males, respectively (column 2), but dropped the portion attributable to individual and environmental contextual characteristics from 44.7% and 63.3% in Model 1 to 41.4 % and 56.0% in Model 2 for females and males, respectively. These results suggest that the explanatory power previously assigned to individual and economic contextual factors were in part due to racial differences in weight misperceptions. When the weight misperception covariates were added, the total explained portion of the BMI disparity for Hispanic-white females and males, respectively, remained almost unchanged increasing from 62.8% to 63.1% for females and from 78.3% to 80.4% for males. As shown in Table IX, weight misperceptions explained only 3.3% and 2.4% of the Hispanic-white BMI gap in Model 2 for females and males, respectively. These results suggest that weight misperceptions previously omitted in Model 1 were important and independent determinants of the black-white racial disparity in BMI but less important for the Hispanic-white ethnic disparity in BMI: the portion attributable to weight misperceptions was about 13.0% and 18% for the black-white female and male gap, respectively compared to 3.3% and 2.4% for the Hispanic-white female and male BMI

gap, respectively. Weight misperceptions therefore contributed significantly to the total explained portion of the black-white BMI gap making up 23.9% (13.0% of the 54.3% total explained) and 24.6% (18.3% of the 74.3% total explained) of the total explained portion for females and males, respectively, but contributed only modestly to the Hispanic-white total explained BMI gap, making up only 5.2% and 3% of Hispanic-white total explained portion for females and males, respectively.

Table IX: Percentage Contributions from Decomposition Model of Racial/Ethnic Disparities in Adolescent Body Mass Index

	Black-White Adolescent Females (BMI gap=2.2 units) N=4013		**Hispanic-White Adolescent Females** (BMI gap=0.9 units) N=3719	
(Column)	(1)	(2)	(3)	(4)
Variables	Model 1	Model 2	Model 1	Model 2
Individual, Parental, and Economic Contextual Factors	44.72%	41.36%	62.81%	59.83%
Weight Misperceptions		12.96%		3.31%
Total Percentage Explained	44.72%	54.32%	62.81%	63.13%
	Black-White Adolescent Males (BMI gap=1.1 units) N=4701		**Hispanic-White Adolescent Males** (BMI gap=0.8 units) N=4485	
Variables	Model 1	Model 2	Model 1	Model 2
Individual, Parental, and Economic Contextual Factors	63.31%	56.03%	78.28%	77.97%
Weight Misperceptions		18.30%		2.40%
Total Percentage Explained	63.31%	74.33%	78.28%	80.38%

Note: Variables included in each category correspond to the list shown in Table VII.

Discussion

Study 2 investigated racial/ethnic differences in weight misperceptions, and their contribution towards racial/ethnic disparities in adolescent BMI. Overall, more than one-half adolescents correctly identified their weight status, with statistically significantly more whites and Hispanics doing so compared to their black counterparts (62.2%, 57.3%, and 61.8% for white, black and Hispanic adolescent females, respectively and 57.6%, 53.3%, and 57.8% for white, black, and Hispanic adolescent males, respectively). Looking at gender differences, higher proportions of men under-perceived their weight and lower proportions of men over-perceived their weight status as compared to their female counterparts from the corresponding racial/ethnic groups. Looking at racial/ethnic differences within same gender groups, white and Hispanic adolescents were more likely to over-perceive their weight status compared to black adolescents for both genders (24.9%, 14.1%, and 22.3% for white, black, and Hispanic adolescent females, respectively, and 7.3%, 3.6% and 6.3% for white, black, and Hispanic adolescent males, respectively). For females, more than twice as many black adolescents and close to one quarter more Hispanic adolescents under-perceived their weight status compared to their white counterparts (12.9%, 28.6%, and 15.9% for white, black, and Hispanic adolescent females, respectively). In particular, almost three times more overweight black adolescents and 40% more overweight Hispanic adolescents under-perceived their weight status when compared to their overweight white counterparts. In addition, 23% more obese black adolescents under-perceived their weight status when compared to their obese white counterparts. The differences in the rate of weight under-perceptions were not as sharp across racial/ethnic groups for males. Black adolescent males, and in particular overweight black males, under-perceived their weight at

higher rates than their white and Hispanic counterparts (52.5%, 80.1%, and 58% for white, black, and Hispanic overweight male adolescents).

Study 2 found that weight misperceptions were particularly important factors in explaining the black-white BMI gap for adolescents, increasing the total explained portion of the BMI disparity from 44.7% to 54.3% for females and from 63.3% to 74.3% for males. When added to the Hispanic-white BMI model, weight misperceptions increased the total explained portion of the BMI disparity just slightly from 62.8% to 63.1% for females and only form 78.3% to 80.4% for males. Weight misperceptions explained 13.0% and 3.3% of the black-white and Hispanic-white BMI gaps for females, respectively, and explained 18.3% and 2.4% of the black-white and Hispanic-white BMI gaps for males, respectively. The large increase in the total explained portion of the black-white BMI gap from the inclusion of weight misperceptions (from 44.7% to 54.3%, an approximate 10 percentage points increase for females and from 63.3% to 74.3% , an approximate 11 percentage points increase for males) suggests that previously omitted weight misperceptions are important determinants of the black-white racial disparity in adolescent female BMI that were not accounted for by the individual, household, and contextual controls.

In addition, Study 1 showed that weight under-perceptions were significantly associated with higher BMI for all adolescents but to a greater extent for black and Hispanic adolescents. This suggests that not only do the differences in misperceptions contribute to the explained racial/ethnic BMI gaps, but the differential association of under-perceptions with BMI further exacerbates the unexplained part of the disparity.

These results lend only partial support to this study's hypothesis that stated that weight perceptions will significantly contribute to both black-white and Hispanic-white BMI gaps. One

reason for which weight perceptions explain such a low proportion of the Hispanic-white BMI gap could be the fact that Hispanics are a heterogeneous group with respect to country of origin, and more importantly, to years since migration, and therefore they may not uniformly adhere to the non-Western larger body ideal. Although there is no empirical evidence regarding differences in weight perceptions by country of origin for Hispanics, I do not expect the weight perceptions to vary wildly by country of origin. However, years since immigration are expected to make a large difference between adolescents who were recent migrants and therefore were not exposed to the Western predominantly white culture as compared to adolescents who were second or third generation of migrants and were partially or fully acculturated. Unfortunately, these hypotheses cannot be tested using the current data, as NLSY97 does not provide good measures for country of origin or years since migration. Future research is needed in this area.

This study is subject to a number of limitations. First, height and weight were self-reported. Second, the CER2 data were collected only in limited geographic areas characterize by a higher standard of living and they were not continuously sampled, therefore the data were not fully comparable over time (Powell and Chaloupka, 2009). Third, the outlet density data were subject to count error and may have classification errors (Powell et al., 2011). Fourth, the geographic identifiers in the NLSY97 data only allowed us to control for the economic contextual measures at the county level rather than at more proximate levels. Fifth, smaller sample sizes among the gender-racial/ethnic subgroups may have limited statistical power in the regression analyses that assessed the differential associations with BMI by race and ethnicity. Finally, differences in other social and cultural factors such as immigration generation to the U.S., social support, and stress, as well as dietary and physical activity preferences may

contribute to the racial/ethnic disparities and deserve further attention in future disparities-related obesity research.

Despite these limitations, several key and interesting results emerged from Study 2. Study 2 documented that compared to white adolescents, higher percentages of black and Hispanic adolescents under-perceived their weight status. This disparity was particularly prevalent between black and white overweight adolescents. This study's findings are consistent with a recent study where black and Hispanic adults reported self-perceived health status as higher than their actual clinical health status (Perez and Warren, 2012). Positive attitudes toward health, and weight in particular, among black and Hispanic adults may have a protective effect against certain eating disorders such as anorexia nervosa (Warren et al., 2005). At the same time, however, these perceptions may pose a serious problem with respect to increased risk of obesity. These results, although compelling, document only the association between weight under-perceptions and female adolescents BMI. Further research is needed to clearly establish potential causality.

Overall, the study results suggest that policies aimed at reducing the obesity epidemic, and the racial/ethnic BMI gap should try to address the racial/ethnic differences in weight misperceptions through early education regarding the interpretation and identification of one's weight status. Adjustments in perceptions may help to reduce disparities in weight outcomes, particularly between black and white adolescent females, and help to reduce related health disparities. Given that weight misperceptions are formed at the individual level but are often influenced by cultural norms, there may be an important role for school-based identification of clinical overweight and obesity status to help reduce the incidence of obesity among adolescents.

Chapter 4: Weight misperceptions and actual weight—Quantile regressions

Study 2 showed that overweight and obese adolescents from all racial/ethnic groups under-perceive their weight status at higher rates than their normal weight counterparts, and that in particular black overweight and obese adolescents have the highest prevalence of weight under-perceptions. In contrast, underweight females and males over-perceived their weight at higher rates than their normal weight counterparts. These findings suggest that overweight and obese adolescents represent a particular vulnerable population for under-perceptions, while underweight adolescents represent a particular vulnerable population for over-perceptions.

The analytical methods used in Study 1 and Study 2 were based on estimates of the mean. However, this might not be a very informative approach if the population of interest is in a different part of the outcome distribution. Study 3 is designed to determine whether weight misperceptions and their effect on actual weight differ across the weight distribution. Of particular interest is the effect of weight under-perceptions on adolescent BMI for individuals that are near or above the threshold of being overweight and the effect of weight over-perceptions on adolescent BMI for individuals who are near or below the threshold of being underweight.

Research Questions and Hypotheses

Study 3 will investigate the following research questions and hypotheses:

Q1: Are weight under-perceptions' impact on adolescent BMI different across the BMI distribution?

Q2: Are weight over-perceptions' impact on adolescent BMI different across the BMI distribution?

Q3: Are there any racial/ethnic differences in weight misperceptions' impact across adolescent BMI distribution?

H1: Weight under-perceptions will have a larger impact for adolescents who are near or above overweight threshold.

H2: Weight over-perceptions will have a larger impact for adolescents who are near or below the underweight threshold.

H3: The effects of weight under-perceptions will be larger for minority youths as compared to their white counterparts.

H4: The effects of weight over-perceptions will be larger for white female adolescents as compared to their black and Hispanic counterparts.

H5: The effect of weight under-perceptions will be larger for low-SES adolescents as compared to their high-SES counterparts.

H6: The effect of weight over-perceptions will be larger for high-SES adolescents compared to their low-SES counterparts.

Methods

Data

Study 3 uses the same data as Study 1, which is individual-level data from four waves (1997-2000) of the National Longitudinal Survey of Youth 1997 (NLSY97). As in Study1, the initial sample consisted of 17,540 person-year observations on an unbalanced panel of 4,385 adolescent females and 18,396 person-year observations on an unbalanced panel of 4,599 adolescent males. This sample was restricted to include only adolescents who were living at home and were age 18 or younger in all four waves. The sample was further restricted to include

only the observations with non-missing information on all of the covariates. The final estimation sample included 7,285 person-year observations on an unbalanced panel of 2,862 adolescent females and 8,585 person-year observations on an unbalanced panel of 3,290 adolescent males in 312 different counties across the U.S.

Outcome Measures

The outcome of interest was adolescent BMI calculated as weight (in kilograms) divided by height squared (in meters). Self-reported weight and height were collected in each year of the survey.

Weight Perception Measures

Three categorical weight perception indicators, under-perceived, correctly perceived and over-perceived weight, were created as the difference between the survey respondents' perception of their weight status and their actual weight status based on clinical definitions of weight (for details see Study 1, Methods, pg.17).

Control Measures

The same standard controls as those used in Study 1 were used here. All analyses used individual and household characteristics including age, age at menarche for female adolescents, youth's income (including allowance and wages), hours per week worked by youth, living arrangements (living with both or just one parent), and mother's working status (working full-time, part-time, or not working). Parental income and mothers' education were used as proxies for household SES. In addition, controls for economic contextual factors consisting of food prices, food availability, and physical activity outlets that may contribute to obesity were also included in all analyses. Finally, controls for median county-level household income and

indicators for three types of residence (urban, suburban or rural) using data from Census 2000 merged to the NLSY97 at the county level were included.

Empirical Implementation

The empirical models outlined previously (OLS, RE, FE, 2SLS) are conditional-mean models. They estimate the means of a response variable conditional on the values of the explanatory variables. Although widely used, the conditional-mean models cannot be easily extended to non-central locations. In other words, if the subpopulations of interest are in the lower or upper tail of the response distribution, using conditional-means models may be inefficient or even miss the point of the research (Hao and Naiman, 2007). Given that weight perceptions may affect weight differently depending on which part of the conditional distribution of weight an individual is (i.e. I expect different effects of weight unde-perceptions on weight for marginally overweight individuals as compared to underweight individuals), Quantile Regression (QR) seems an appropriate estimation technique. QR models conditional quantiles as a function of the explanatory variables, allowing for different marginal effects of weight perceptions on weight by quantiles of the entire distribution of weight (Koenker and Hallock, 2001). Weight is estimated as follows:

$$q_\tau\,(BMI_{ist}) = \delta_0^\tau + \delta_1^\tau WP_{ist} + \delta_2^\tau ECF_{st} + \delta_3^\tau X_{ist} + \delta_4^\tau D_t + \varepsilon_{ist} \qquad (5)$$

where τ represents the τth quantile of the conditional distribution of BMI. Of particular interest is how the parameters δ_1 change as we move across quantiles.

Eq. (5) is next modified to exploit the longitudinal nature of the data. Specifically, a QR with individual fixed effects is estimated as follows:

$$q_\tau\,(BMI_{ist}) = \delta_0^\tau + \delta_1^\tau WP_{ist} + \delta_2^\tau ECF_{st} + \delta_3^\tau X_{ist} + \delta_4^\tau D_t + \vartheta_i + \varepsilon_{ist} \quad (6)$$

where ϑ is time-invariant unobserved individual heterogeneity and ε is a standard error. The time invariant unobserved individual heterogeneity is fixed in all quantiles. In other words, the location of the dependent variable of the conditional quantile of interest will be shifted by ϑ (Koenker, 2004).

Cross sectional QR are analyzed using STATA 12 while individual-level FE QR are analyzed using R 3.0.0.

Results

Summary Statistics

Study 3 used the same sample as Study 1. The results are presented in Table I and show that on average, adolescent females had a BMI of 22 units and adolescent males had a BMI of 23 units. On average the majority of adolescents correctly perceived their weight status. More female adolescents (21.8%) over-perceived their weight status as compared to their male adolescents (6.7%) counterparts, and fewer female adolescents (15.9%) under-perceived their weight as compared to their male (35.3%) counterparts.

Regression Results

Table X shows the results from cross sectional and individual-level fixed-effects quantile regressions as well as the results obtained from OLS and individual FE analyses. In general, cross-sectional QR showed a complex pattern of findings and the individual FE QR analyses were quite consistent.

Cross-sectional QR showed that for female and male adolescents, weight under-perceptions were negatively associated with adolescent BMI below the 50^{th} quantile and positively associated with adolescent BMI at the 50^{th} quantile and above. This suggests that mean OLS estimates (2.1 and 2.6 BMI units for female and male adolescents, respectively)

severely overestimated the association of weight under-perceptions with adolescent BMI for adolescents approximately below the 50th quantile (-0.6 and -0.2 for 10th quantile female and male adolescents, respectively and -0.5 and 0 for 25th quantile for females and males, respectively) and underestimated this association for adolescents approximately above the 50th quantile (5.9 and 5.4 for the 75th quantile for female and male adolescents, respectively and 6.5 and 6.2 for the 90th quantile for females and males, respectively). Similarly, cross sectional QR found an unexpected positive association between weight over-perceptions and adolescent BMI for female adolescents approximately below the 90th quantile and for males approximately above the 10th quantile and below the 90th quantile. Only for females in the 90th quantile and for males in the 10th and 90th quantiles were over-perceptions of weight negatively associated with adolescent BMI.

In contrast to the cross section results, results from the FE QR model were quite consistent. In the FE QR model, weight under-perceptions were significantly positively associated with adolescent BMI across all BMI quantiles. Similarly, weight over-perceptions were consistently negatively associated with adolescent BMI across all BMI quantiles. Although results for over-perceptions were significant for males across all the quantiles, the results for females were only significant at the 90th quantile.

The longitudinal quantile regression results suggest that for females, individual FE estimates (0.8) may overestimate the association between weight under-perceptions and adolescent BMI for adolescents approximately below the 50th quantile (0.5 and 0.6 BMI units for adolescent females in the 10th and 25th quantile) and may underestimate the relationship for adolescents in the 75th (1.8 BMI units) and 90th (1.6 BMI units) quantile. For male adolescents, the longitudinal quantile regression results suggest that individual FE may underestimate the

relationship between under-perceptions of weight and adolescent BMI across all levels of the BMI distribution.

Turning to the over-perceptions of weight, FE QR results show no significant relationship for female adolescents below the 90^{th} quantile, which suggests that individual FE are overestimating for most weight categories and are underestimating the relationship for adolescents in the 90^{th} quantile (-0.4 versus -0.7 BMI units for individual FE and 90^{th} quantile FE QR, respectively). For males, individual FE may overestimate the relationship between weight over-perceptions and adolescent BMI for the whole BMI distribution.

Giving that individual FE QR are superior to the cross sectional QR as they account for time-constant unobserved heterogeneity, FE models will be discussed in detail next.

Table X: Quantile Regression of Adolescent Body Mass Index—Model Specification

	Female Adolescents (N=7,285)									
	Cross-Sectional Quantile Regression					Individual Fixed Effects Longitudinal Quantile Regression				
	Q .10	Q .25	Q .50	Q .75	Q .90	Q .10	Q .25	Q .50	Q .75	Q .90
Under-Perceived	-0.553***	-0.545***	2.536***	5.927***	6.501***	0.486**	0.639***	1.342***	1.780***	1.577***
Weight	(0.083)	(0.099)	(0.544)	(0.265)	(0.393)	(0.215)	(0.203)	(0.367)	(0.276)	(0.409)
Over-Perceived	0.555***	1.271***	1.174***	0.270**	-1.449***	-0.030	-0.165	-0.086	-0.145	-0.704***
Weight	(0.177)	(0.095)	(0.097)	(0.122)	(0.183)	(0.201)	(0.187)	(0.137)	(0.165)	(0.194)
	Ordinary Least Squares					Individual Fixed Effects				
Under-Perceived			2.092***					0.845***		
Weight			(0.249)					(0118)		
Over-Perceived			0.122					-0.399***		
Weight			(0.105)					(0.099)		
	Male Adolescents (N=8,585)									
	Cross-Sectional Quantile Regression					Individual Fixed Effects Longitudinal Quantile Regression				
	Q .10	Q .25	Q .5	Q .75	Q .90	Q .10	Q .25	Q .5	Q .75	Q .9
Under- Perceived	-0.243***	-0.045	3.220***	5.415***	6.175***	1.519***	1.975***	2.056***	2.352***	2.938***
Weight	(0.090)	(0.110)	(0.117)	(0.132)	(0.238)	(0.159)	(0.229)	(0.201)	(0.165)	(0.149)
Over- Perceived	-1.828***	0.635**	0.998***	0.329***	-0.940***	-0.294*	-0.267*	-0.311**	-0.395***	-0.430***
Weight	(0.181)	(0.300)	(0.116)	(0.116)	(0.196)	(0.158)	(0.150)	(0.137)	(0.138)	(0.136)
	Ordinary Least Squares					Individual Fixed Effects				
Under-Perceived			2.581***					0.988***		
Weight			(0.159)					(0.077)		
Over-Perceived			-0.181					-0.908***		
Weight			(0.143)					(0.131)		

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at county level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Table XI shows the results for the full model of individual-level FE QR for female adolescents. Under-perceptions of weight were positively significantly associated with adolescent BMI for all quantiles. The magnitude of the estimates was highest for female adolescents in the 75th quantile (1.8 BMI units) followed by the 90th quantile (1.6 BMI units), suggesting that the impact of under-perceptions is strongest for females about at or above overweight category, followed by those who are about obese. Over-perceptions of weight were significantly associated with adolescent BMI only for adolescents in the 90th quantile. For these adolescents, misperceiving their weight as higher was associated with 0.7 lower BMI units as compared to adolescents who correctly identify their weight.

Living in one parent households was a risk factor for increased BMI for adolescent females approximately at 25th and 75th quantiles. Having a mother who completed more than high school was a protective factor for adolescent BMI for females in the 50th and 90th quantiles, and parental income was a protective factor for adolescent females in the bottom of the BMI distribution (approximately below the 75th quantile). Increased number of grocery stores was associate with 0.2 higher BMI units for adolescent females in the 90th quantile and having more physical activity outlets was associated with 0.3 lower BMI units only for adolescent females in the 50th quantile.

Table XI: Individual Fixed Effects Quantile Regressions: Female Adolescents Sample

N=7,285	Q .10	Q .25	Q .50	Q .75	Q .90
Under-Perceived Weight	0.486**	0.639***	1.342***	1.780***	1.577***
	(0.215)	(0.203)	(0.367)	(0.276)	(0.409)
Over-Perceived Weight	-0.030	-0.165	-0.086	-0.145	-0.704***
	(0.201)	(0.187)	(0.137)	(0.165)	(0.194)
Youth Income	-0.378	0.249	0.964**	0.636	0.297
	(0.572)	(0.400)	(0.458)	(0.423)	(0.609)
Hours Of Work Per Week	-0.001	0.004	0.008*	0.008	0.004
	(0.005)	(0.004)	(0.004)	(0.005)	(0.006)
Youth Lives With One Parent	0.177	0.877***	0.364	0.628**	0.351
	(0.364)	(0.306)	(0.298)	(0.264)	(0.432)
Mother Works Full Time	0.106	-0.059	-0.150	-0.016	-0.430
	(0.221)	(0.242)	(0.203)	(0.231)	(0.293)
Mother Works Part Time	0.044	-0.096	-0.177	-0.235	-0.016
	(0.220)	(0.233)	(0.238)	(0.249)	(0.247)
Mother Low[a] Education	-0.060	0.101	-0.195	0.219	-0.501
	(0.523)	(0.419)	(0.389)	(0.245)	(0.318)
Mother High[b] Education	-0.368	-0.104	-0.751**	-0.525	-0.767**
	(0.328)	(0.327)	(0.336)	(0.368)	(0.364)
Parental Income	-0.053*	-0.054***	-0.053**	-0.064	-0.032
	(0.028)	(0.018)	(0.023)	(0.040)	(0.043)
Price of Fast Food	-0.986	-0.541	-0.162	0.041	0.493
	(0.628)	(0.466)	(0.607)	(0.701)	(0.669)
Price of Food At Home	0.976	-0.031	-0.919	-0.354	0.385
	(1.194)	(0.954)	(0.886)	(1.128)	(1.028)
Fast Food Restaurants[1]	0.104	0.039	0.144	-0.072	0.273
	(0.185)	(0.097)	(0.157)	(0.131)	(0.186)
Non-Fast Food Restaurants[1]	-0.015	0.003	0.005	0.031	-0.095
	(0.044)	(0.037)	(0.030)	(0.039)	(0.061)
Grocery Stores[1]	-0.002	0.046	0.017	-0.001	0.177*
	(0.092)	(0.079)	(0.062)	(0.078)	(0.099)
Convenience Stores[1]	-0.209	-0.196*	-0.004	0.022	-0.013
	(0.138)	(0.116)	(0.121)	(0.117)	(0.166)
Physical Activity Outlets[1]	-0.146	-0.010	-0.255**	-0.153	-0.038
	(0.112)	(0.098)	(0.095)	(0.119)	(0.151)
Median Household Income	-0.701***	-0.349**	-0.134	-0.372**	0.226
	(0.159)	(0.169)	(0.136)	(0.179)	(0.231)

Note: All regressions include year trends, controls for suburban and rural residency, and a dummy variable indicator of the quality of the price match. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$; [a] Mother completed high school; [b] Mother completed more than high school—Omitted category mother completed less than high school; [1] Per 10000 capita.

Table XII shows the results for individual-level FE QR for male adolescents. Weight under-perceptions were positively and significantly associated with adolescent BMI for all quantiles. The impact of weight under-perceptions was highest for males in the 90th quantile, suggesting that for adolescents at approximately obesity or above, under-perceiving one's weight was associated with 2.9 higher BMI units as compared to adolescents who correctly identified their weight. Over-perceptions of weight were negatively and significantly associated with adolescent male BMI across the entire weight distribution.

Youth's income, number of hours worked per week, and living in a single parent household were risk factors for male adolescent BMI. Having a mother that completed more than high school was a protective factor for male adolescent BMI (except for males in the 90th quantile). Parental income was a protective factor for male adolescents in the 90th quantile. Increased number of non-fast food restaurants was a risk factor for adolescents in the 25th and 75th quantiles, and increased number of physical activity outlets was a protective factor for males in the 25th and 90th quantiles.

Table XII: Individual Fixed Effects Quantile Regressions: Male Adolescents Sample

N=8,589	Q .10	Q .25	Q .5	Q .75	Q .90
Under Perceived Weight Status	1.519***	1.975***	2.056***	2.352***	2.938***
	(0.159)	(0.229)	(0.201)	(0.165)	(0.149)
Over Perceived Weight Status	-0.294*	-0.267*	-0.311**	-0.395***	-0.430***
	(0.158)	(0.150)	(0.137)	(0.138)	(0.136)
Youth Income	1.349***	1.395***	1.352***	1.385***	1.460***
	(0.339)	(0.337)	(0.328)	(0.342)	(0.351)
Hours Of Work Per Week	0.008**	0.005*	0.012***	0.010***	0.008**
	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)
Youth Lives With One Parent	0.365**	0.356**	0.305*	0.358**	0.461**
	(0.161)	(0.169)	(0.157)	(0.167)	(0.184)
Mother Works Full Time	0.094	0.032	0.139	0.102	0.091
	(0.159)	(0.141)	(0.139)	(0.141)	(0.167)
Mother Works Part Time	-0.220	-0.210	-0.191	-0.152	-0.228
	(0.163)	(0.161)	(0.148)	(0.166)	(0.179)
Mother Low[a] Education	-0.148	-0.131	-0.001	-0.061	-0.052
	(0.188)	(0.194)	(0.197)	(0.189)	(0.213)
Mother High[b] Education	-0.360*	-0.379*	-0.456**	-0.439**	-0.396
	(0.196)	(0.200)	(0.195)	(0.198)	(0.203)
Parental Income	0.002	0.010	-0.006	-0.026	-0.065*
	(0.028)	(0.020)	(0.020)	(0.021)	(0.035)
Price Of Fast Food	-0.569	-0.462	-0.098	-0.046	0.026
	(0.434)	(0.435)	(0.439)	(0.432)	(0.447)
Price Of Food At Home	-0.383	-0.340	-0.188	-0.194	-0.161
	(0.810)	(0.810)	(0.806)	(0.804)	(0.814)
Fast Food Restaurants[1]	0.063	0.054	0.114	0.109	0.141
	(0.094)	(0.085)	(0.095)	(0.097)	(0.114)
Non-Fast Food Restaurants[1]	0.014	0.085**	0.016	0.075**	0.027
	(0.033)	(0.033)	(0.028)	(0.033)	(0.046)
Grocery Stores[1]	0.021	-0.038	-0.010	-0.037	0.076
	(0.046)	(0.065)	(0.045)	(0.063)	(0.072)
Convenience Stores[1]	0.081	0.083	0.104	0.161*	0.110
	(0.087)	(0.074)	(0.131)	(0.094)	(0.115)
Physical Activity Outlets[1]	-0.078	-0.184***	-0.068	-0.108	-0.226***
	(0.074)	(0.068)	(0.087)	(0.086)	(0.083)
Median Household Income[1]	-0.192**	-0.141	0.034	0.129	0.388***
	(0.075)	(0.102)	(0.095)	(0.095)	(0.105)

Note: All regressions include year trends, controls for suburban and rural residency, and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at county level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$; [a] Mother completed high school; [b] Mother completed more than high school—Omitted category mother completed less than high school; [1] Per 10000 capita.

Table XIII shows the association of weight under-perceptions by racial/ethnic and SES subgroups for female adolescents. For white females, weight under-perceptions were significantly associated with 1.4 higher BMI units only for the adolescents at approximately the 90^{th} quantile. In contrast, for both black and Hispanic adolescent females, weight under-perceptions and adolescent BMI were significantly associated across the entire BMI distribution. For black females, the highest impact of weight under-perceptions was found for adolescents at approximately 75^{th} quantile (2.6 higher BMI units), while for Hispanic adolescents the highest impact was for adolescents at approximately 90^{th} quantile (2.4 higher BMI units)

Analyses stratified by SES showed that weight under-perceptions were significantly associated with higher BMI for low-SES adolescent females across the entire weight distribution, with adolescents at approximately 90^{th} quantile having the highest magnitudes of associations (3.4 and 2.3 higher BMI units for low-income, low-education adolescents, respectively). For adolescent females from high-SES households, weight under-perceptions were significantly associated with adolescent BMI only for adolescents form the upper part of the BMI distribution (50^{th} quantile and higher for high-income and only for the 75^{th} quantile for high-education females, respectively). In addition, the effect of weight under-perceptions on adolescent BMI was lower in magnitude for high-SES females as compared to the corresponding low-SES estimates (1.2 vs. 2.1 higher BMI units for high- versus low-SES adolescents at approximately the 75^{th} quantile).

Analyses stratified by race/ethnicity and SES showed that for all low-SES black and Hispanic adolescent females, weight under-perceptions were significantly associate with increased BMI across the whole BMI distribution, and the magnitude of association was higher compared to the corresponding estimates for their high-SES counterparts. For both black and

Hispanic low-SES adolescents, females at approximately 90th quantile had the highest magnitude of association (4.7 and 3.8 higher BMI units for black and Hispanic low-income adolescents, respectively, and 2.9 and 3.9 higher BMI units for black and Hispanic low-education households, respectively). Weight under-perceptions were not significantly associated with adolescent BMI for black high-income adolescents approximately below the 75th quintile, and for high-education Hispanic adolescents.

For whites, weight under-perceptions had no significant association across the BMI distribution for high-SES adolescent females. Non-significant associations were also found for low-income females at the 25th and 50th quantile and for females from low-education households below the 50th quantile.

Table XIII: Association of Weight Under-Perception with Female Body Mass Index—Individual Fixed Effects Quantile Regression by Subgroups

By Race	Q.10	Q .25	Q .50	Q .75	Q .90
White	0.252	0.080	0.374	0.738	1.416***
(N=3953)	(0.203)	(0.276)	(0.285)	(0.477)	(0.354)
Black	1.519***	2.099***	2.252***	2.611***	2.235***
(N=1871)	(0.416)	(0.413)	(0.342)	(0.412)	(0.583)
Hispanic	1.421***	0.675	1.509***	1.399**	2.370***
(N=1531)	(0.443)	(0.419)	(0.415)	(0.622)	(0.606)
By Income					
High Income	0.217	0.187	0.778***	1.160***	1.299***
(N=3683)	(0.219)	(0.208)	(0.241)	(0.390)	(0.364)
Low Income	1.685***	1.190***	2.215***	2.090***	3.446***
(N=3602)	(0.382)	(0.384)	(0.350)	(0.570)	(0.723)
By Education					
Mother High Education	0.139	0.117	0.435	1.117***	0.836
(N=3228)	(0.269)	(0.232)	(0.278)	(0.321)	(0.574)
Mother Low Education	1.164***	0.945***	2.134***	2.074***	2.326***
(N=4057)	(0.281)	(0.212)	(0.262)	(0.353)	(0.647)
By Race and Income					
White High Income	-0.157	-0.145	0.053	0.434	0.543
(N=2734)	(0.313)	(0.242)	(0.297)	(0.401)	(0.427)
White Low Income	1.260*	0.659	0.799	2.306***	2.290**
(N=1219)	(0.705)	(0.550)	(0.658)	(0.573)	(0.957)
Black High Income	0.923	1.045	1.285	1.536**	1.487*
(N=479)	(0.754)	(0.768)	(0.784)	(0.755)	(0.760)
Black Low Income	2.882***	3.613***	3.664***	4.391***	4.717***
(N=1392)	(0.443)	(0.425)	(0.417)	(0.426)	(0.464)
Hispanic High Income	1.607*	2.209**	2.452***	2.673***	2.814***
(N=470)	(0.832)	(0.853)	(0.858)	(0.858)	(0.843)
Hispanic Low Income	2.439***	2.871***	3.076***	3.513***	3.814***
(N=991)	(0.649)	(0.687)	(0.701)	(0.690)	(0.704)
By Race and Education					
White High Education	-0.105	-0.264	0.031	0.320	0.605
(N=2198)	(0.249)	(0.291)	(0.351)	(0.471)	(0.457)
White Low Education	0.419	0.470	0.929**	1.833***	1.965**
(N=1755)	(0.387)	(0.344)	(0.352)	(0.511)	(0.744)
Black High Education	1.271**	1.391***	1.386**	2.034**	2.532***
(N=665)	(0.622)	(0.477)	(0.564)	(0.796)	(0.824)
Black Low Education	1.981***	2.146***	2.518***	2.410***	2.921***
(N=1206)	(0.504)	(0.625)	(0.485)	(0.658)	(0.753)
Hispanic High Education	1.146	1.275	1.220	1.321	1.406
(N=365)	(1.074)	(1.086)	(1.094)	(1.095)	(1.089)
Hispanic Low Education	2.621***	2.974***	3.137***	3.634***	3.919***
(N=1096)	(0.572)	(0.574)	(0.562)	(0.562)	(0.574)

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at county level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Table XIV shows the association of weight under-perceptions by racial/ethnic and SES subgroups for male adolescents. For all racial/ethnic and SES groups, weight under-perceptions were significantly associated with increased BMI across the whole weight distribution, with adolescents at approximately 90^{th} quantile having the highest magnitude of association for all specifications. Analyses stratified by race show that compared to their white counterparts, black and Hispanic males had higher magnitudes of associations at all quantiles.

Analyses stratified by SES show that low-SES adolescents had higher magnitudes of association compared to their high-SES counterparts across the entire BMI distribution. For example, males from high-income, high-education households at approximately 90^{th} quantile had 2.3 and 2.6 higher BMI units, respectively as compared to males from low-income, low-education households who had 3.9 and 3.3 higher BMI , respectively.

Turning to analyses stratified by race/ethnicity and SES, results show that black and Hispanic adolescent males from all SES levels had higher magnitudes of association compared to their white counterparts for all quantiles. White and Hispanic males from low-SES had higher magnitudes of association than their higher-SES counterparts. For black males, the magnitudes of association were similar between low- and high-SES adolescents for all quantiles.

Table XIV: Association of Weight Under-Perception with Male Body Mass Index—Individual Fixed Effects Quantile Regression by Subgroups

By Race	Q.10	Q .25	Q .50	Q .75	Q .90
White	1.242***	1.392***	1.751***	2.103***	2.407***
(N=4950)	(0.235)	(0.248)	(0.232)	(0.198)	(0.219)
Black	3.138***	3.095***	3.223***	4.055***	4.478***
(N=2020)	(0.247)	(0.256)	(0.277)	(0.262)	(0.249)
Hispanic	2.717***	2.634***	2.618***	2.999***	3.556***
(N=1619)	(0.328)	(0.295)	(0.304)	(0.301)	(0.299)
By Income					
High Income	1.278***	1.435***	1.326***	1.934***	2.361***
(N=4418)	(0.229)	(0.213)	(0.209)	(0.199)	(0.238)
Low Income	2.477***	2.609***	2.566***	3.541***	3.923***
(N=4171)	(0.172)	(0.149)	(0.175)	(0.205)	(0.150)
By Education					
Mother High Education	1.163***	1.448***	2.000***	2.179***	2.575***
(N=3750)	(0.227)	(0.197)	(0.197)	(0.198)	(0.214)
Mother Low Education	2.167***	2.417***	2.029***	2.748***	3.310***
(N=4839)	(0.205)	(0.164)	(0.260)	(0.174)	(0.165)
By Race and Income					
White High Income	1.122***	1.056***	1.450***	1.813***	2.168***
(N=3343)	(0.168)	(0.154)	(0.191)	(0.170)	(0.184)
White Low Income	2.204***	2.094***	2.709***	3.027***	3.080***
(N=1607)	(0.266)	(0.274)	(0.265)	(0.275)	(0.275)
Black High Income	3.305***	3.421***	3.718***	4.103***	4.293***
(N=550)	(0.629)	(0.623)	(0.642)	(0.653)	(0.655)
Black Low Income	3.127***	3.169***	3.761***	4.090***	4.426***
(N=1470)	(0.326)	(0.283)	(0.288)	(0.266)	(0.277)
Hispanic High Income	1.832***	1.793***	2.176***	2.371***	2.466***
(N=525)	(0.470)	(0.472)	(0.483)	(0.476)	(0.473)
Hispanic Low Income	3.129***	3.211***	3.184***	3.660***	4.033***
(N=1094)	(0.465)	(0.379)	(0.359)	(0.405)	(0.395)
By Race and Education					
White High Education	0.924***	1.088***	1.100***	1.525***	1.848***
(N=2638)	(0.257)	(0.250)	(0.258)	(0.251)	(0.278)
White Low Education	2.064***	2.177***	2.644***	2.823***	3.100***
(N=2312)	(0.270)	(0.280)	(0.260)	(0.257)	(0.265)
Black High Education	3.800***	3.654***	3.669***	4.468***	4.627***
(N=727)	(0.529)	(0.498)	(0.518)	(0.528)	(0.540)
Black Low Education	3.272***	3.341***	3.093***	3.907***	4.272***
(N=1293)	(0.324)	(0.356)	(0.364)	(0.344)	(0.343)
Hispanic High Education	2.559***	2.499***	2.702***	2.883***	2.913***
(N=385)	(0.598)	(0.618)	(0.595)	(0.587)	(0.595)
Hispanic Low Education	2.795***	2.859***	2.997***	3.354***	3.6660***
(N=1234)	(0.413)	(0.370)	(0.362)	(0.395)	(0.397)

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. The regressions are weighted using NLSY sampling weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at county level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Table XV shows the association of weight over-perceptions and female adolescent BMI by race/ethnicity and SES subgroups. Weight over-perceptions were not statistically associated with black or Hispanic adolescent BMI. For whites, over-perceptions were associated with 0.5 higher BMI units for adolescents at approximately 10^{th} quantile, and with 0.7 lower BMI units for adolescents at the 90^{th} quantile.

Results of analyses by SES subgroups show that for high-SES adolescent females, over-perceptions of weight are associated with 0.5 and 0.8 higher BMI units for adolescents at approximately 10^{th} quantile, from high-income and high-education households, respectively, and were associated with 0.5 lower BMI units for adolescents at 90^{th} quantile, and from high-income households. For low-SES adolescents, over-perceptions of weight were associated with 0.6 and 0.8 lower BMI units for adolescents at approximately 90^{th} quantile and from low-income and low-education households, respectively.

Analyses stratified by race/ethnicity and SES show that for high-SES white adolescent females weight over-perceptions were associated with increased BMI for adolescents in the bottom of the weight distribution (10^{th} quantile for high-income and 10^{th} and 25^{th} quantiles for adolescents from high-education households). No association between adolescent BMI and weight over-perceptions were found for black high-SES adolescents across the entire weight distribution. For black low-SES adolescents, over-perceptions of weight were associated with lower BMI across the whole BMI distribution for adolescents from low-income households, and for adolescents at 75^{th} and 90^{th} quintile for females belonging to low-education households. For Hispanics, weight over-perceptions were associated with increased BMI for both SES groups, particularly among adolescents from the bottom of the income distribution (approximately below 50^{th} quantile).

Table XV: Association of Weight Over-Perception with Female Body Mass Index—Individual Fixed Effects Quantile Regression by Subgroups

Race	Q.10	Q .25	Q .50	Q .75	Q .90
White	0.502**	-0.101	-0.216	0.166	-0.650***
(N=3953)	(0.241)	(0.208)	(0.205)	(0.175)	(0.186)
Black	-0.330	-0.333	-0.364	-0.525	0.098
(N=1871)	(0.410)	(0.335)	(0.387)	(0.373)	(0.495)
Hispanic	0.495	0.427	0.026	-0.256	-0.483
(N=1531)	(0.369)	(0.349)	(0.315)	(0.295)	(0.438)
By Income					
High Income	0.526**	0.157	0.198	-0.206	-0.473*
(N=3683)	(0.230)	(0.188)	(0.219)	(0.180)	(0.236)
Low Income	0.363	-0.415*	-0.077	-0.304	-0.570*
(N=3602)	(0.271)	(0.231)	(0.265)	(0.226)	(0.294)
By Education					
Mother High Education	0.812***	0.232	0.125	-0.051	-0.295
(N=3228)	(0.294)	(0.200)	(0.207)	(0.178)	(0.357)
Mother Low Education	-0.289	-0.334	0.106	-0.565**	-0.841***
(N=4057)	(0.312)	(0.219)	(0.286)	(0.224)	(0.269)
By Race and Income					
White High Income	0.533***	0.116	-0.134	-0.178	-0.289
(N=2734)	(0.196)	(0.213)	(0.238)	(0.224)	(0.299)
White Low Income	0.560	-0.211	-0.034	0.035	-0.468
(N=1219)	(0.379)	(0.337)	(0.319)	(0.377)	(0.464)
Black High Income	-0.240	-0.158	-0.379	-0.502	-0.524
(N=479)	(0.606)	(0.589)	(0.575)	(0.578)	(0.589)
Black Low Income	-0.659*	-0.773**	-0.688**	-0.924**	-1.222***
(N=1392)	(0.344)	(0.344)	(0.339)	(0.345)	(0.344)
Hispanic High Income	0.832**	0.695**	0.569	0.450	0.328
(N=470)	0.350	0.345	0.345	0.352	0.382
Hispanic Low Income	0.861***	0.777***	0.567**	0.434*	0.282
(N=991)	(0.250)	(0.246)	(0.225)	(0.240)	(0.256)
By Race and Education					
White High Education	0.716***	0.459**	0.012	-0.020	-0.073
(N=2198)	(0.246)	(0.183)	(0.180)	(0.202)	(0.335)
White Low Education	0.433	-0.376	-0.727**	-0.108	-0.570*
(N=1755)	(0.318)	(0.284)	(0.349)	(0.316)	(0.338)
Black High Education	0.608	-0.275	-0.570	-0.089	-0.065
(N=665)	(0.583)	(0.448)	(0.510)	(0.697)	(0.682)
Black Low Education	-0.834	-0.598	-0.434	-1.259**	-1.731***
(N=1206)	(0.509)	(0.416)	(0.486)	(0.587)	(0.586)
Hispanic High Education	1.036**	1.000**	0.960**	0.972**	0.904**
(N=365)	(0.434)	(0.429)	(0.431)	(0.433)	(0.435)
Hispanic Low Education	0.664**	0.611**	0.453	0.275	0.093
(N=1096)	(0.308)	(0.288)	(0.300)	(0.290)	(0.314)

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Table XVI shows the associations of weight over-perceptions and male adolescent BMI by race/ethnicity and SES subgroups. Analyses stratified by race/ethnicity showed significant associations between weight over-perceptions and lower adolescent male BMI only for blacks. Analyses stratified by SES show significant associations between weight over-perceptions and lower male BMI for low-SES adolescents and for high-income adolescents at approximately 50th quantile. The magnitudes of associations are similar across different quantiles for all low-SES adolescents (approximately 0.5 lower BMI units).

Analyses stratified by race/ethnicity and SES show no relationship between weight over-perceptions and male BMI for white high-SES, black high-education, and for Hispanic adolescents (from both low- and high-SES). For low-SES whites and for low-SES and high-income blacks, weight over-perceptions were associated with lower adolescent BMI.

Table XVI: Association of Weight Over-Perception with Male Body Mass Index—Individual Fixed Effects Quantile Regression by Subgroups

By Race	Q.10	Q .25	Q .50	Q .75	Q .90
White	-0.210	-0.204	-0.197	-0.294*	-0.350**
(N=4950)	(0.167)	(0.163)	(0.161)	(0.154)	(0.157)
Black	-1.390***	-1.319***	-1.204***	-1.243***	-1.339***
(N=2020)	(0.275)	(0.276)	(0.272)	(0.259)	(0.267)
Hispanic	0.176	0.142	0.074	0.020	0.037
(N=1619)	(0.322)	(0.320)	(0.320)	(0.303)	(0.317)
By Income					
High Income	-0.034	-0.037	-0.288*	-0.242	-0.250
(N=4418)	(0.180)	(0.169)	(0.157)	(0.168)	(0.166)
Low Income	-0.480**	-0.481**	-0.433*	-0.447**	-0.575***
(N=4171)	(0.222)	(0.219)	(0.223)	(0.201)	(0.209)
By Education					
Mother High Education	-0.055	0.015	-0.002	-0.152	-0.129
(N=3750)	(0.199)	(0.191)	(0.174)	(0.177)	(0.181)
Mother Low Education	-0.475*	-0.484**	-0.477*	-0.555**	-0.627**
(N=4839)	(0.257)	(0.239)	(0.238)	(0.227)	(0.240)
By Race and Income					
White High Income	0.063	0.038	-0.013	-0.104	-0.118
(N=3343)	(0.151)	(0.147)	(0.149)	(0.148)	(0.147)
White Low Income	-0.701**	-0.687**	-0.704**	-0.697**	-0.842**
(N=1607)	(0.341)	(0.337)	(0.331)	(0.327)	(0.331)
Black High Income	-1.515**	-1.477**	-1.447**	-1.486**	-1.531**
(N=550)	(0.677)	(0.678)	(0.672)	(0.670)	(0.671)
Black Low Income	-1.460***	-1.418***	-1.356***	-1.340***	-1.428**
(N=1470)	(0.467)	(0.468)	(0.455)	(0.455)	(0.449)
Hispanic High Income	-0.032	0.006	-0.062	-0.149	-0.154
(N=525)	(0.588)	(0.589)	(0.575)	(0.574)	(0.578)
Hispanic Low Income	0.348	0.334	0.290	0.274	0.251
(N=1094)	(0.437)	(0.429)	(0.412)	(0.412)	(0.424)
By Race and Education					
White High Education	0.091	0.107	0.029	-0.061	-0.071
(N=2638)	(0.279)	(0.271)	(0.250)	(0.263)	(0.257)
White Low Education	-0.566*	-0.590*	-0.600*	-0.652**	-0.707**
(N=2312)	(0.333)	(0.324)	(0.317)	(0.314)	(0.327)
Black High Education	-0.669	-0.598	-0.558	-0.595	-0.654
(N=727)	(0.672)	(0.672)	(0.656)	(0.650)	(0.652)
Black Low Education	-1.861***	-1.832***	-1.691***	-1.758***	-1.843***
(N=1293)	(0.571)	(0.569)	(0.567)	(0.571)	(0.571)
Hispanic High Education	-0.104	-0.116	-0.102	-0.171	-0.127
(N=385)	(0.702)	(0.699)	(0.695)	(0.696)	(0.698)
Hispanic Low Education	0.235	0.207	0.188	0.132	0.138
(N=1234)	(0.426)	(0.427)	(0.400)	(0.416)	(0.417)

Note: All regressions include all of the controls listed in Table I. In addition, all models control for year trends and a dummy variable indicator of the quality of the price match. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Discussion

Study 3 investigated the association between weight misperceptions and adolescent BMI across the adolescent weight distribution. Results showed that, individual-level FE overestimated the association between under-perceptions of weight and female BMI for adolescents approximately below the 50th quantile and underestimates this relationship for adolescents approximately at or above the 50th quantile. For males, individual-level FE underestimated the association between weight under-perceptions and adolescent BMI for all quantiles. Individual-level FE underestimated the relationship between weight over-perceptions and female BMI for adolescents at approximately 90th quantile, and overestimated this relationship for the rest of the female adolescents and for male adolescents across the entire BMI distribution.

Results show that for both female and male adolescents from the top weight distribution (at approximately or above the 75th quantiles) the magnitude of association between weight under-perceptions and BMI was larger compared to that of adolescents from quantiles 50 and below. Combined with Study 2's findings that overweight and obese adolescents under-perceive their weight at significantly higher rates, these results show that not only did they misperceive more than their normal weight counterparts, but when they did so, the effect on their body mass index was much larger.

Interestingly, for all females, and for black females, adolescents at approximately the 75th quantile had the highest magnitude of association, suggesting that weight under-perceptions are particularly detrimental for individuals at near or over the overweight threshold. Compared to their counterparts who correctly identify their weight, for this group, misperceiving their weight as lower was associated with 1.9 and 2.6 higher BMI units for females and black females, respectively.

Analyses by race/ethnicity and SES subgroups showed that, as expected for adolescents from minority groups as well as for adolescents from low-SES households, weight under-perceptions had larger associations with adolescent BMI than those found for their white and high-SES counterparts, respectively. For example, for females in the 90th quantile, weight under-perceptions were associated with 2.2 and 2.4 higher BMI units for black and Hispanic adolescents, respectively, as compared to 1.4 higher BMI units for white adolescents.

In contrast, Study 3 found no relationship between over-perceptions of weight and adolescent BMI for adolescent females in the lower part of the weight distribution, as originally hypothesized, and the magnitudes of association were approximately the same across the weight distribution for male adolescents. However, some evidence of higher associations of weight over-perceptions and BMI for adolescents at approximately the 10th quantile of the BMI distribution was found for white and high-SES females, as well as for Hispanics from high- and low-SES. Surprisingly, the direction of association was opposite to the hypothesized one, with over-perceptions of weight being associated with increased BMI. This finding may be similar to the association found by Cuypers and colleagues (2012) when investigating normal weight adolescents who over-perceived their weight. One possible explanation for this unexpected result could be the fact that adolescent females who were very underweight (10th quantile of the BMI distribution) and overperceived their weight might engage in some unhealthy and extreme weight control practices such as long periods of dieting followed by long periods of binge eating or binging and purging behaviors. There is evidence that for female adolescents, body dissatisfaction arising from the pressure to be thin translates into elevated risk for bulimia nervosa and other binge eating disorders (Killen et al., 1996; Patton et al., 1999; Tanofsky-Kraff et al., 2011). In addition, disordered eating and eating disorders are associated with weight gain

(Neumark-Sztainer et al., 2006; 2011; 2012). Therefore, the observed association between weight over-perceptions and BMI for this group could be the result of unhealthy weight control mechanisms.

This study has several limitations. First, by design, adolescents at the top of the weight distribution could not over-perceive their weight and adolescents at the bottom of the weight distribution could not under-perceive their weight. Therefore, estimates of over-perceptions for the 90^{th} quantile and estimates of under-perception for the 10^{th} quantile need to be interpreted with caution. Second, weight and height were self-reported in this study.

Despite these limitations, Study 3 contributes to the literature in several ways. First, it is the first study (to my knowledge) that looks at how weight misperceptions are associated with adolescent BMI across the weight distribution. Second, it tries to eliminate some of the possible bias present because of individual-level unobserved heterogeneity by employing individual-level FE QR. Third, it presents estimates for important sub-groups of interest such as racial/ethnic minorities, as well as SES subgroups.

The results presented in Study 3 suggest that overweight and obese adolescents are at particular risk giving that they under-perceive their weight at higher rates, and also, when they misperceive, the effect was much larger for them. Public policies aimed at obesity prevention may increase their effectiveness if they incorporate education regarding the correct interpretation of personal weight, particularly for minority and low-SES adolescents.

Part Two

Chapter 5: Measures of Body Weight and Risky Sexual Behaviors

Adolescence is a time of habit formation, in which youths are asserting independence from their parents and rely increasingly on feedback and support from their peer groups (Clark and Loheac, 2007; Makdissi and Yazbeck, 2009; Umberson, 2010). During this time physical appearance is extremely important (French et al., 1995; French et al., 1996; Vannatta et al., 2009). As a result, adolescents who are not satisfied with their bodies might be at increased risk to engage in risky behaviors, such as early sexual debut, multiple partners, and failure to use protection during intercourse. Part two of this dissertation examines the impact of different measures of weight (actual weight, weight perceptions, and accuracy of weight perceptions) on the risky sexual behaviors mentioned above.

Literature Review

Early sexual debut and adolescent risky sexual behaviors are quite common. For example, in 2011, nearly half of American high school students (47.4%) reported having had sexual intercourse, 15.3% reported having had sexual intercourse with four or more partners during their lifetime, and only 60.4% of the sexually active adolescents reported condom use the last time they had sex (Eaton et al., 2012). These risky behaviors have many unfortunate consequences, with the most common consequences being unwanted pregnancies (Finer, 2010) and sexually transmitted infections (STI) (Eaton et al., 2012). In particular, female adolescents pay a higher cost for these behaviors than their male counterparts, with STIs being more easily contracted and, when contracted, having more severe health consequences for females (Landry and Turnbull, 1997; Moscicki et al., 1999; Westrom and Eschenbach, 1999). Recent findings

show that almost a quarter (24.1%) of all female adolescents between the ages of 14 and 19 in the U.S. are infected with at least one STI (Finer, 2010). Of particular concern is the fact that some of the most common STIs (e.g. Gonorrhea and Trichomonas) have become increasingly drug-resistant, leaving very few options available for their treatment (del Rio et al., 2007; Dunne et al., 2003; Little et al., 2002).

Family structure, the quality of adolescent-parent relationship, substance use, delinquency, parental socioeconomic status (SES), and religious participation are some of the most important determinants of adolescent sexual behavior (Biglan et al., 1990; Haglund and Fehring, 2010; Kaye et al., 2009; King et al., 2012; Mason et al., 2010; Price and Hyde, 2009) (for more details see Appendix B). In addition, research shows that weight status is also associated with adolescent risky sexual behaviors (Averett et al., 2013; Cheng and Landale, 2011; Sabia and Rees, 2011).

Actual Weight Status and Adolescent Risky Sexual Behaviors

There is a paradox regarding female weight status and its association with sexual behaviors. During adolescence, overweight and obesity status play a protective role for early sexual debut. However, once an adolescent has had sex, overweight and obesity status are associated with higher probability of risky sexual behaviors (Averett et al., 2013; Cawley et al., 2006; Cheng and Landale, 2011; Sabia and Rees, 2011).

One of the first studies that showed the protective effect of overweight and obesity on early sexual debut was Cawley and colleagues (2006). Cawley and colleagues (2006) employed discrete-time event history analyses on two different datasets. In one dataset (AddHealth), they found that compared to their normal weight counterparts, overweight girls had 60% of the odds of sexual initiation, and obese girls had only 32% the odds of initiating sex. However, Cawley

and colleagues (2006) were unable to replicates their findings in using their other dataset (NLSY97). Building on their work, Sabia and Rees (2011), used a 2SLS and an individual-fixed effects approach in order to address potential endogeneity of weight outcomes and found that a 10 lb weight gain led to approximately 6 % decrease in the probability of sexual debut for female adolescents. In addition, Ratcliff and colleagues (2011) found that being extremely obese (BMI ≥ 99th Percentile) was associated with lower odds (OR=0.47) of ever having sexual intercourse for female high school student adolescents (see also Cheng and Landale, 2011 and Averett et al., 2013).

Despite this protective effect for early initiation, overweight and obesity status was shown to hinder romantic relationship formation (Ali et al., 2014; Cheng and Landale, 2011; Cawley et al., 2006; Halpern et al., 2005; Pearce et al., 2002) and to increase the probability of risky sexual activity (multiple partners, no protection, being intoxicated during intercourse, etc.) for female adolescents (Averett et al., 2013; Eisenberg et al., 2005). For example, Averett and colleagues (2013) used a sample of approximately 5,000 adolescent females who participated in the AddHealth survey to investigate the relationship between overweight status and risky sexual behaviors. They used four empirical estimation strategies (linear probability models, 2SLS models, sibling fixed-effects models, and models with controls for youth's taste for risk) and found that overweight adolescents were not more likely to have sex under the influence of alcohol than their normal weight peers, but they were at least 15% more likely than their normal weight counterparts to have ever had anal intercourse. Using a sample of 1,168 college students, Eisenberg and colleagues (2005) found that for females, higher BMI levels were associated with higher odds of having a casual sexual partner (OR=2.70), using no or unreliable contraception (OR=1.98) and being intoxicated at last intercourse (OR=2.31). Similarly, Ratcliff and

colleagues (2011) found that extremely obese college females had greater odds of alcohol/drug consumption before last intercourse (OR=4.6) as compared to their normal weight counterparts.

For males, the relationship between body weight status and risky sexual behaviors shows mixed results (Cawley et al., 2006; Sabia and Rees, 2011; Eisenberg et al., 2005). For example, Cawley and colleagues (2006) found a reverse U shaped relationship between weight status and adolescent males' sexual debut, with underweight, overweight and obese adolescent males having 63%, 76%, and 45% the odds of sexual debut as compared to their normal weight counterparts. In contrast, Sabia and Rees (2011) found no significant relationship between weight and adolescent male sexual debut when they controlled for possible endogeneity of weight outcomes. Eisenberg and colleagues (2005) and Ratcliff and colleagues (2011) also found no relationship between measures of weight and male's sexual debut and risky sexual behaviors (being intoxicated at last intercourse, casual sexual partner, and using no contraception during intercourse). Cheng and Landale (2011) found that underweight status but not overweight status was associated with decreased odds of sexual debut for males.

Turning to racial/ethnic differences in the relationship between weight status and risky sexual behaviors, research shows some differences for female adolescents (Akers et al., 2009; Ali et al., 2014; Cheng and Landale, 2011; Leech and Dias, 2012). In a recent study, Ali and colleagues (2014) investigated racial differences in the relationship between obese status and sexual debut for approximately 4,000 adolescent females who participated in wave II (1996) of AddHealth survey. Using OLS, OLS with lagged values of obese status and 2SLS models, Ali and colleagues (2014) found that obese white adolescents were significantly less likely to be involved in a romantic relationship, to have been physically intimate, and to ever have had sex than their non-obese counterparts. No significant relationship was found for obesity status and

black adolescent girls' risky sexual behaviors (Ali et al., 2014). Similarly, Leech and Dias (2012) found that overweight and obese white adolescent females participating in NLSY79 survey had an increased probability of risky sexual behaviors (increased number of sexual partners, having sex with older partners, and being less likely to use condoms), but no such relationship was found for black adolescent females (see also Cheng and Landale, 2011). In contrast, Akers and colleagues (2009) found that black adolescent females who had low BMI values had lower odds of condom use (OR=0.05) while Hispanic female adolescents who had low BMI values had higher odds of four or more lifetime sexual partners (OR=11.9) compared to their normal-weight counterparts. In addition, overweight Hispanic adolescent girls had 2.6 times the odds of reporting early sexual debut than their normal-weight counterparts (Akers et al., 2009)

To date, there is a lack of research regarding racial/ethnic differences in the association between weight status and risky sexual behaviors for male adolescents. Study 4 of this dissertation will fill some of this gap.

Weight Perceptions and Adolescent Risky Sexual Behaviors

There is also some evidence that perceptions of weight are important predictors of risky sexual behaviors, although much less research has examined weight perceptions than actual weight status. Cawley and colleagues (2006) found that for the male adolescents that participated in the AddHealth survey, but not for the females, perceptions of under-weight were associated with decreased odds of early sexual debut. For both females and males, perceptions of overweight were associated with decreased odds of early sexual debut. Using a cross-sectional sample of approximately 7,000 female adolescents who participated in the 2005 Youth Risk Behavior Surveillance Survey, Akers and colleagues (2009) found that perceptions of overweight were associated with decreased odds of ever having had sex (OR=0.8) as compared to their

counterparts who perceived their weight about normal. In addition, adolescents who perceived themselves as overweight had elevated odds of early sexual debut (OR=1.6) and reduced odds of reporting condom use at the last intercourse (OR=0.8). Misperceiving one's weight as overweight was associated with 0.6 the odds of using condom, compared to their counterparts who correctly identified their weight (Akers et al., 2009). Analyses stratified by race/ethnicity showed that white females who misperceived their weight status as underweight had higher odds of ever having had sex and of reporting 4 or more lifetime partners. In addition, white adolescent females who misperceived their weight status as overweight had lower odds of condom use. Black adolescent females who misperceived their weight as being overweight were more likely to report multiple sexual partners.

Social and Cultural Norms Regarding Weight

The literature documenting racial/ethnic differences in the relationship between measures of weight status and adolescent risky sexual behaviors is scarce, particularly for male adolescents and for other measures of weight status such as perceptions and misperceptions of weight. Study 4 attempts to fill some of this gap and to explain racial/ethnic differences in this relationship by incorporating social and cultural norms regarding weight into its conceptual framework. Although social and cultural norms regarding weight status are not directly measured, it is assumed that belonging to a certain racial/ethnic group is a proxy for upholding the social and cultural norms pertaining to that group.

Social and cultural norms are responsible for the differences in what each social and cultural group defines as attractive and romantically desirable. As shown in Chapter 2 (Pg. 5-8), when defining what is attractive, black and Hispanic adolescents find heavier bodies as more beautiful (Ali et al., 2013; Barroso et al., 2010; Gil-Kashiwabara, 2002; Powell and Kahn, 1995;

Thompson et al., 1996) and black female adolescents describe beauty largely in terms of psychological traits (Parker et al., 1995). In addition, anthropologists argue that groups that historically lived in poverty identify heavier bodies with affluence, health, and power, and as a result heavier bodies became an image of beauty (Barroso et al., 2010; Brown and Konner, 1987; Johnson and Broadnax, 2003). Also, for these groups, heavier bodies are perceived as being more resilient to illness, while thinness is associated with famine, disease, and poverty (Barroso et al., 2010; Brown and Konner, 1987). As a result, black and Hispanic youth see heavier bodies as attractive while underweight bodies are seen as unappealing. In contrast, white adolescents' description of beauty focuses on physical characteristics and mirrors the ultra thin body emphasized in the media, particularly for females, while overweight and obese bodies are seen as unappealing (Parker et al., 1995; Poran, 2002).

Analytical Framework: Measures of Weight and Risky Sexual Behaviors.

The current conceptual framework builds on work by Cawley and colleagues (2006) and Averett and colleagues (2013). Within their framework, adolescents participate in the dating market and in the market for sex, and derive utility from sexual intercourse which is a function of one's partner appearance, from personal appearance, and from personal reputation. Appearance reflects one's attractiveness and personal reputation is affected by a partner's appearance and by the number of partners one has (Averett et al., 2010; Cawley et al., 2006). Having an attractive partner enhances one's reputation and having an unattractive partner diminishes it. The relationship between partner attractiveness and personal reputation is not as strong in the market for sex as compared to the dating market because one's sexual partner is not as easily identifiable as one's dating partner. Furthermore, increased number of sexual partners enhances the

reputation of male adolescents but diminishes that of female adolescents (the “double standard”). Formally,

Utility=U(Sex(App_p), App_o, Rep(App_p, NP_s), X_o)

App= (MW)

where, App_p= One’s partner’s appearance

App_o=Own appearance

Rep=Own reputation

NP_s=Number of sexual partners

X_o=Vector of all other utility enhancing factors

MW=Measures of weight

In the original version of this model, attractiveness was constant across racial/ethnic groups, with overweight or obese adolescents being defined as unattractive. One of the theoretical contributions of Study 4 is that it allows attractiveness to vary across groups. As a result, for the white adolescents, overweight or obese statuses are proxies for unattractiveness and for the black and Hispanic adolescents underweight status is a proxy for an unattractive appearance.

In this framework, assortative matching is expected, with adolescents of approximately same level of attractiveness becoming sexual partners (Berscheid et al., 1971; Schafer and Keith, 1990). However, because one’s sexual partner is not as overt as one’s dating or marriage partner and the number of sexual partners increases males’ reputation, assortative matching in the sex market will not be as strong as in the dating or marriage market. In fact, male adolescents will be willing to have sex with a less attractive partner for three reasons. First, equally attractive female adolescents will ration their sexual activity to preserve reputation, so they will be less available.

Second, there is some evidence that adolescent males with a positive body image are more likely to engage in risky sexual behaviors such as non-condom use and multiple partners (Gillen et al., 2006). This suggests that some male adolescents who perceive themselves as attractive derive utility from risky sex, particularly considering that costs associated with risky sex are lower for males than for females. In addition, less attractive female adolescents will be more willing to engage in risky sexual behaviors, like sex without condoms, in exchange for intimacy and a more attractive partner. Third, male adolescents do not incur any reputation penalty for their amount of sexual activity. All three reasons suggest that male adolescents will be willing to pair with a less attractive female. Less attractive females may trade-off safe sexual behaviors for intimacy and a more attractive partner. Thus, unattractive, sexually active female adolescents may move from a dating market to a market for sex. In contrast, unattractive males who are sexually active will have no bargaining power to persuade their partner to engage in risky sex. Therefore they are expected to be less likely to engage in risky sex.

Turning to early sexual debut, it is unclear a priori if unattractive adolescents will postpone the start of their sexual life. It could be the case that less attractive female adolescents will choose to postpone sexual debut rather than incur reputation loss from both having sex and matching with an equally unattractive male. However, it could also be the case that unattractive girls will be willing to forgo some reputation loss from initiating sexual activity in exchange for a more attractive partner and intimacy. Therefore, it becomes an empirical question if unattractive female adolescents will delay sexual debut or initiate earlier sexual activity.

Early sexual debut is typically defined as sexual debut that occurs before age 15 (Spriggs and Halpern, 2008). Giving that the average puberty onset for female adolescents occurs around age 12 (Walvoord, 2010), the need for intimacy is not as high in 12 to 14 year olds as it is for

older adolescents. Evidence shows that until the age of 15, peer approval and reputation are very important for adolescents considering intimate relationships (Collins, 2003). Therefore, I hypothesized that the loss of reputation at this age may not be offset entirely by matching with a more attractive partner, so unattractive young adolescent girls may postpone sexual debut.

Unattractive males will be less likely to have early sexual debut because they will be "crowded out" from the sex market by attractive males.

Research Questions and Hypotheses

Given that overweight bodies are seen as less attractive by whites, and thin bodies are seen as less attractive by blacks and Hispanics, this paper investigates the following questions and hypotheses:

Q1: Are adolescents with weight status that is stigmatized by their cultural group (i.e. overweight and obese white and underweight black and Hispanic adolescents) more likely to engage in early sexual debut, or are they less likely to do so?

Q2: Are there any gender differences regarding the association of weight measures with early sexual debut?

Q3: Are adolescents with weight statuses that are stigmatized by their culture more likely to engage in risky sexual behavior?

Q4: Are any gender differences in the association of measures of weight with risky sexual behavior?

H1: Overweight white and underweight black and Hispanic female adolescents will be less likely to have earlier sexual debut than their normal weight counterparts.

H2: Once sexually active, overweight white and underweight black and Hispanic female adolescents will be more likely to engage in risky sexual behaviors (increased number of sexual partners and decreased number of times contraceptives are used).

H3: Overweight white and underweight black and Hispanic male adolescents will be less likely to have earlier sexual debut than their normal weight counterparts.

H4: Once sexually active, overweight white and underweight black and Hispanic male adolescents will be less likely to engage in risky sexual behaviors (increased number of sexual partners and decreased number of times contraceptives are used).

Methods

Data

Study 4 used individual-level data from the National Longitudinal Survey of Youth 1997 (NLSY97). The association between body weight measures and early sexual debut used the first three waves of the survey (1997-1999). A large body of information on individual and household characteristics was available for each year of the survey. NLSY uses a computer assisted self-interview system when collects sensitive information about youths such as sexual activity and dating. Early sexual debut is typically defined as sexual debut that occurs before age 15 (Spriggs and Halpern, 2008), therefore only adolescents that were aged 12-14 in all three years were kept in the analytical sample. The initial sample consisted of 4,088 and 4,377 person-year observations for female and male adolescents respectively on an unbalanced panel of 2,216 and 2,354 female and male adolescents, respectively. This sample was further restricted to observations with non-missing information on all of the covariates. The final sample was 1,088 and 1,407 person-year observations for female and male adolescents respectively, on an unbalanced panel of 722 and 858 female and male adolescents, respectively.

The association between body weight measures and risky sexual behaviors used the first six waves of the survey (1997-2002). The initial sample was comprised of 18,965 and 20,085 female and male person-year observations respectively, on an unbalanced panel of 4,214 and 4,432 female and male adolescents aged 12-18 years, respectively. After restricting the sample to include only youths who started their sexual life there were 6,586 and 7,578 female and male person-year observations, respectively on an unbalanced panel of 2,299 females and 2,497 male adolescents. The final sample for estimating the association between body weight measures and risky sexual behaviors included only observations with non-missing information on all the covariates and was 2,179 and 2,574 female and male person-year observations on an unbalanced panel of 1,116 and 1,268 female and male adolescents, respectively.

Outcome Measures

To examine sexual debut, a binary indicator was created that equaled 1 if the individual initiated sexual activity for the first time since the last interview and 0 if the individual was not sexually active (i.e., she or he is still at risk of initiation). This variable was constructed using the question asked in the first wave of NLSY97 “Have you ever had sexual intercourse, that is, made love, had sex, or gone all the way with a person of the opposite sex?”, and for the subsequent waves of the survey the question that asked “Have you had sexual intercourse since the last interview, that is, made love, had sex, or gone all the way with a person of the opposite sex?” Once sexual activity was initiated, the individual was not at risk of initiation anymore; therefore she or he was dropped from the sample, such that only individuals who did not initiate yet sexual activity remained in the risk pool.

Two outcome variables were created to examine the association between body weight measures and risky sexual behaviors. The first outcome variable attempted to measure the

number of sexual partners adolescents had in the last year and was created using the NLSY question that asked “How many partners have you had sexual intercourse with in the last 12 months?” The second outcome variable was the number of times adolescents reported using contraceptives during sex last and was created using the NLSY question that asked “Thinking about all the times that you have had sexual intercourse in the last 12 months, how many of those times did you or your sexual partner or partners use a method of birth control?” Both outcome variables were count variables.

Exposure to sexual activity is important when examining risky sexual behaviors. For example, using contraceptives once during the single sexual encounter in the last year is different than using contraceptives once over 10 sexual encounters in the last year. To control for this, all regressions included natural logarithm of number of times the youth had sex last year with a constrained parameter of one. As a result, the outcome variables of interest can be interpreted as the expected number of sexual partners proportional to the times of having sex last year and the expected number of contraceptive used proportional to the times of having sex in the last year.

In the first waves, NLSY97 only included questions regarding heterosexual sexual activity. Therefore, only heterosexual sexual activity was analyzed here.

Key Explanatory Variables

Three sets of body weight measures were created. First, a set of dummies for female adolescents’ body weight status was created using the Centers for Disease Control and Prevention (CDC) age and gender specific growth charts as follows: underweight equals one if BMI percentile was less than 5^{th} BMI percentile, zero otherwise; normal weight equals one if BMI percentile was between 5^{th} and 85^{th} BMI percentile, zero otherwise; and overweight equals one if BMI percentile was equal to or more than the 85^{th} BMI percentile, zero otherwise.

The second set of body weight measures shows adolescents' perceptions of their own weight, based on a question that asked the youths to describe their weight. Three dummy variables were created: perceived underweight equals one if the youth rated her weight as being very underweight or somewhat underweight; perceived normal equals one if the youth rated her weight as being about the right weight; and perceived overweight equals one if the youth rated her weight as being somewhat overweight or very overweight.

Lastly, a set of body weight measures were created to indicate the correctness of youth's weight perceptions. These were created by comparing the CDC-defined weight categories with the perceived weight categories described above. Three categorical variables were created: misperceived skinnier than clinical weight- equals one if adolescent's perceived weight was lighter than her/his CDC-defined weight status; correct- equals one if the adolescent's perceived weight was the same as her/his CDC-defined weight status; and misperceived heavier than clinical weight- equals one if the adolescent's perceived weight was heavier than her/his CDC-defined weight status.

Other Control Variables

Youth characteristics.

A series of youth individual characteristics were included in all analyses. These included race/ethnicity, age, age of puberty onset, working status (binary variable that equaled one if the youth reported a positive amount of hours worked in an year, and zero otherwise), the PIAT math score as a control for educational achievement, binary variables for self-reported health status (excellent health, good health, and poor health (reference category)), as well as youths' living arrangements (binary indicator for living with only one parent). In addition, a number of choice variables that were shown in the literature to be related to risky sexual behaviors were

included in some of the analyses. For example, literature has shown that anti-social behaviors and substance use in adolescence are related to risky sexual behaviors (Biglan et al., 1990; King et al., 2012; Mason et al., 2010; Price and Hyde, 2009). As a result three measures for social behavior and substance use were used.

The first measure was an index of behavioral and emotional problems that included four questions regarding poor school work, having trouble sleeping, lying or cheating, and being sad or unhappy. The responses were measured on a three point scale ranging from 0 "not true" to 2 "often true". This measure was only collected in 1997 and was created by summing up answers to the four questions on the index. Higher scores indicated higher behavioral and emotional problems.

The second measure was an index of substance use that was created from three questions that asked if the youth ever smoked a cigarette, ever drank an alcoholic beverage, and ever used marijuana in their lifetime. The responses for each question (0-no; 1-yes) were summed, with higher scores indicating more instances of substance use. This index was available in every year of the survey.

The third measure was an index of delinquency. This index was created by summing up responses to ten yes or no (1,0, respectively) questions that asked if the youth: ever run away from home; ever carried a hand gun; ever belonged to a gang; ever purposefully destroyed property that did not belong to her/him; ever stolen something worth less than $50; ever stolen something worth more than $50; ever committed other property crimes; ever attacked someone in an attempt to seriously hurting them; ever sold or helped selling drugs; ever being arrested for an illegal or delinquent offense. Higher scores indicated more instances of delinquency. This index was available in each wave of the survey

In addition, there is some evidence that depression is associated with risky sexual behavior (Kaltiala-Heino et al., 2003; Lehrer et al., 2006; Shrier et al., 2001) therefore a binary indicator that that equaled 1 if the youth reported to be depressed and zero otherwise was included in all regressions. Also included in some of the analyses were a binary indicator that indicated if the youth reported no religious affiliation and a measure of number of dates the youth had in the previous year.

Parental characteristics

Parental income and mothers' education were used as proxies for household SES, which have been shown to be associated with adolescent risky sexual behaviors. Information on parental income (including wages and salary, investments, child support, and social assistance), and information regarding mother's education (less than high school, high school, some college and more) were collected each year and obtained from both the parental questionnaire and the youth reports. In addition, information regarding mother's working status (not working, working part time, or working full time) was included in all regressions.

Youth-parent relationship

The amount of parental involvement in the youth's life were important predictors of adolescent risky sexual behaviors (Haglund and Fehring, 2010; Kaye et al., 2009) and thus two measures of youth-parent relationship were used. The first measure was an index of who sets boundaries for youth. It was created by summing up the answers (0-youth sets limits; 1-parents and youth jointly set limits; and 2-parents set limits) to three questions regarding who sets limits when deciding: how late the youth can stay out; who can she/he hang out with; and what types of shows and movies she/he can watch. Higher scores on this index represented higher parental control. The second measure was an index of family routines. It attempted to capture the amount

the family is involved in the youth's life. It was created by summing up the responses (ranging from 0,"no days per week" to 7, "7 days per week") to four questions regarding how many days per week: does the youth eat dinner with the family; the household chores get to be done by the end of the day; does she/he do something fun with the family; and does she/he do something religious like going to church or praying with the family. Higher scores indicated higher family involvement. Unfortunately, the youth-parents relationship indexes were available only from 1997-1999. Therefore, they were used as controls only for the analysis of sexual debut.

State sentiment towards adolescent sexual activity

The percentages of counties in the state not having an abortion provider (clinic, hospital or doctor's office where abortions are performed) were obtained from Guttmacher Institute's website. The state-level teen pregnancy rate was calculated as the number of pregnancies per 1,000 women aged between 15-19 years old, and includes estimated number of pregnancies ending in miscarriages and stillbirths (Guttmacher Institute, 2010). Both measures were included in all regression as proxies for liberal versus conservative sentiment on abortion and sexual activity.

Place of residency

All regressions controlled for place of residency: south (reference category), north-east, north-central, or west and for urbanicity (urban being the reference category, suburban or rural).

Empirical Models

Understanding early sexual debut entails a consideration of not only if adolescents choose to become sexually active, but also the timing of this choice. The variable of interest in this case was the time from puberty onset (i.e., the time of first menstruation for females and the time of physical and emotional changes such as developing stronger body odors, developing body hair or

starting to have mood swings for boys) to the time when an adolescent chooses to become sexually active. In this context, an adolescent is at risk of becoming sexually active from the moment they experience their puberty onset. Standard ordinary multiple regression models are not optimal for estimating early sexual debut because "censoring" and time-varying explanatory variables can produce severe bias and loss of information (Allison, 1982; Allison, 1984). An observation is censored if the time of becoming sexually active is unknown because the individual did not initiate sex by the end of the observation period. Event history analysis accounts for both censoring and time-varying explanatory variables and estimates the individual hazard rate. The hazard rate is the probability that an individual will become sexually active within a particular year, given that the individual is at risk for sexual initiation at that time (Allison, 1982; Rabe-Hesketh and Skrondal, 2012).

For the study of early sexual debut, event history analysis using discrete time methods was implemented. In this analysis, in each period, adolescents face a decision about when to become sexually active. Although the decision to initiate sexual activity could be made at any time, in NLSY97 individuals were observed only on an annual basis. Therefore, it could not be determined exactly at which time the sexual debut took place, only if sexual debut took place since the last survey interview. Because of this, discrete time methods as opposed to continuous time methods for event history analysis were more appropriate (Allison, 1982; Allison, 1984). The discrete time event history models were estimated using a probit specification to estimate the hazard rate.

The following equation was estimated using discrete time methods:

$$SX_{ist} = \beta_1 WP_{it} + \beta_2 X_{it} + \beta_3 PX_{it} + \beta_4 YP_{it} + \beta_5 SSC_{st} + \beta_6 R_{st} + + \beta_7 Yr_t + \varepsilon_{ist} \quad (1)$$

where: SX is a dichotomous indicator that equals 1 if the individual became sexually active since last interview and 0 if the individual did not yet initiated sexual activity. Once adolescents became sexually active they were removed from the estimation sample such that only adolescents that are at risk of becoming sexually active are kept in the analyses.

WP_{it} represents body weight measures (weight status, weight perceptions, and correctness of weight perceptions) for individual i at time t.

X_{it} is a vector of individual characteristics which include age, age at menarche, youth's working status, youth's score on behavioral problems, substance use, and delinquency indexes, youth depression indicator, youth's religious affiliation, and youth living arrangements (living with one vs. both parents).

PX_{it} is a vector of parental characteristics (income, mother's working status, and mother's education).

YP_{it} is a vector of measures for the youth-parent relationship.

SSC_{st} represents state-level environment regarding teen sexual activity;

R_{st} is a vector that measures youth's place of residence.

and Yr_t represents a vector of year fixed effects.

ε is a standard error term.

Fixed Effects Poisson (FE Poisson) models were used to estimate the relationship between adolescent risky sexual behaviors and body weight outcomes. Both outcome variables of interest (number of sexual partners last year and times any contraceptives used last year) were count variables that follow a Poisson distribution. The assumption of the Poisson regression model is that the data are equally dispersed, in other words the conditional mean and conditional variance are equal. This condition seldom holds, with most count data being over-dispersed (i.e.

conditional variance larger than the conditional mean) as was found to be the case in this dataset for both outcome variables. A negative binomial regression model can account for over-dispersion in the data by introducing an unobserved heterogeneity term. Unfortunately to date, negative binomial regression models for panel data are plagued by weaknesses such as difficulty in interpreting the parameters of the beta distribution and the incidental parameters problem (for a detailed discussion see Allison and Waterman, 2002; Rabe-Hesketh and Skrondal, 2012). One way of handling the over-dispersion present in the data is by using the sandwich estimator for the standard errors. FE Poisson models account for the within individual correlation over time and uses a robust sandwich-based estimator to account for over-dispersion. One strength of the FE Poisson model is that the incidental parameters problem does not apply: parameter estimates are consistent given fixed number of observations for each unit (Rabe-Hesketh and Skrondal, 2012).

The expected risky sexual behaviors were modeled using a log-linear model. The following model is estimated using FE Poisson:

$$Ln(RBehav_{ist}) = \beta_1 WP_{it} + \beta_2 X_{it} + \beta_3 PX_{it} + \beta_4 SSC_{st} + \beta_5 R_{st} + + \beta_6 Yr_t + \alpha_i + \varepsilon_{ist}$$

where $RBehav_{ist}$ represents the risky sexual behaviors (number of partners in the last year and number of times contraception was used last year) for individual i, at time t, and in county s. As mentioned before, exposure to sexual activity is important when examining risky sexual behaviors. To control for this, all regressions included the natural logarithm of the number of times the youth had sex last year (ln sex_{it}) with a constrained parameter of one. The results can be interpreted as the expected value of contraceptive use proportional to the times of having sex in the last year.

WP_{it}, X_{it}, PX_{it}, SSC_{st}, R_{st}, and Yr_t were same control variables as described above. α_i is the constant individual specific residual and ε_{ist} is the standard residual term. FE Poisson allows α_i to be arbitrarily correlated with the independent variables and provides within person equation estimates. At the same time, the time constant independent variables in the vector X_{it} and the constant individual-level error α_i are differenced out. In addition, all FE Poisson models were conditional on sexual debut.

Results

Summary Statistics

Early Sexual Debut

Table XVII shows the summary statistics for the female adolescent sample (12-14 years old) used in estimating the probability of early sexual debut. Overall, 15.8% of female adolescents became sexually active between the ages of 12-14, with significantly more black adolescents doing so when compared to their white and Hispanic counterparts (25.0% vs. 14.7% and 14.7% of sexually active black, white, and Hispanic adolescents, respectively).

The majority of female adolescents (86.9%) had normal weight status with significantly more white adolescents belonging to this body weight category as compared to their black counterparts (88.5% vs. 77.3% white and black normal weight female adolescents, respectively). Significantly more white adolescents were underweight as compared to their black counterparts (2.6% vs. 1.9% of white and black underweight adolescents, respectively). More than twice as many black female and 66% more Hispanic female adolescents were overweight as compared to their white counterparts (20.8% and 14.8% vs. 8.9% of black, Hispanic and white adolescents, respectively were overweight).

Table XVII: Summary Statistics—Female Adolescents: Means (Standard Errors) and Frequencies

	All	White	Black	Hispanic
Outcome Variable				
Ever Had Sex	15.78%	14.66%	24.95%[1]	14.72%[2]
Weight Measures				
Underweight	2.18%	2.59%	1.90%[1]	2.04%
Normal Weight	86.91%	88.54%	77.31%[1]	83.21%
Overweight	10.91%	8.87%	20.79%[1]	14.75%[1]
Perceived Underweight	12.70%	13.37%	10.83%	9.83%
Perceived Normal	55.18%	55.11%	57.53%	53.48%
Perceived Overweight	32.12%	31.53%	31.64%	36.69%
Misperceived Heavier	22.16%	23.55%	12.49%[1]	21.77%[2]
Correctly Perceived	60.68%	61.13%	56.21%[1]	62.25%[2]
Misperceived Skinnier	17.16%	15.32%	31.30%[1]	15.98%[2]
Youth Characteristics				
White	76.18%			
Black	11.15%			
Hispanic	12.66%			
Age	13.51 (0.02)	13.51 (0.03)	13.50 (0.05)	13.56 (0.04)
PIAT math	101.10 (0.55)	103.49 (0.65)	91.28 (1.36)[1]	95.21 (1.21)[1,2]
Excellent Health	35.39%	37.48%	32.08%	25.45%[1]
Good Health	27.89%	24.42%	45.75%[1]	33.51%[1,2]
Age Puberty	12.01 (0.05)	12.15 (0.06)	11.51 (0.11)	11.58 (0.10)[1]
Lives With One Parent	28.86%	26.49%	42.74%[1]	31.10%[2]
Youth Works	18.07%	17.88%	22.49%	15.52%
Behavior Problem Index	1.45 (0.05)	1.41 (0.06)	1.47 (0.09)	1.64 (0.12)
Substance Use Index	1.19 (0.04)	1.24 (0.04)	0.82 (0.07)[1]	1.21 (0.08)[2]
Delinquency Index	0.87 (0.05)	0.85 (0.06)	0.90 (0.09)	0.94 (0.10)
Depressed	7.75%	7.22%	7.98%	10.89%
No Religion	9.42%	10.14%	6.60%	7.72%
Number of Dates	2.99 (0.04)	3.08 (0.05)	2.55 (0.09)[1]	2.85 (0.09)[1,2]
Parental Characteristics				
Mother Less Than High School	16.97%	13.35%	23.38%	33.34%[1,2]
Mother High School	34.22%	33.48%	40.85%	33.35%
Mother More Than High School	48.81%	53.17%	35.77%[1]	33.31%[1]
Parental Income ($1982-84)	33173.63 (1119.27)	36517.63 (1335.88)	18897.74[1] (2464.18)	25097.63[1] (2875.09)
Mother Full Time Employed	61.47%	61.82%	61.40%	60.37%
Mother Part Time Employed	19.93%	20.87%	14.56%	18.65%
Mother Does Not Work	18.60%	17.31%	24.03%	20.99%
Place of Residence				
Urban Residence	67.54%	64.30%	76.77%[1]	79.22%[1]

(Continued)

Table XVII (Continued)

	All	White	Black	Hispanic
Suburban Residence	12.75%	13.63%	6.96%[1]	12.10%[2]
Rural Residence	19.71%	22.07%	16.27%	8.68%[1]
Northeast	18.82%	19.33%	17.85%	16.87%
North Central	23.41%	26.03%	14.93%[1]	14.71%[1]
West	21.79%	19.65%	11.82%[1]	43.24%[1,2]
South	35.97%	34.99%	55.40%[1]	25.17%[1,2]
Youth-Parent Relationship				
Autonomy and Control Index	2.38 (0.04)	2.36 (0.05)	2.48 (0.10)	2.41 (0.08)
Family Routine Index	9.78 (0.17)	9.79 (0.21)	10.06 (0.45)	9.34 (0.37)
State-Level Controls For Adolescent Pregnancy				
Birth Rates[a]	88.73 (0.59)	86.25 (0.72)	94.21 (1.28)[1]	98.56 (1.10)[1]
Abortion Provider[b]	74.80 (0.76)	76.78 (0.89)	72.88 (1.85)	64.65 (1.93)[2]
N	1088	636	215	237

Note: Summary statistics are weighted using NLSY sampling weights. [1] Statistically different than whites at P<0.05. [2] Statistically different than blacks at P<0.05.[a] Number of pregnancies per 1,000 women aged between 15-19 years old. [b] Percentages of counties in the state not having an abortion provider.

There were no significant differences in the prevalence of weight perceptions across racial and ethnic groups, with approximately 13% of female adolescents perceiving their weight as underweight or very underweight and approximately 32% perceiving their weight as overweight or very overweight. However, close to twice as many black female adolescents misperceived their weight as lower than their CDC-defined weight status as compared to their white and Hispanic counterparts (31.3% vs. 15.3% and 16.0% black, white, and Hispanic female adolescents, respectively).

Compared to their black and Hispanic counterparts, white females scored higher on the PIAT math test (103.5, 91.3, and 95.2 PIAT math scores for white, black, and Hispanic females, respectively) and had on average more dating partners in the previous year (3.1, 2.6, and 2.9 dating partners for white, black, and Hispanic females, respectively). In addition, compared to their black counterparts, white females were less likely to live in one parent households (26.5% vs 42.7% white and black females, respectively), and scored higher on the substance use index (1.2 vs. 0.8 for white and black adolescents, respectively).

Compared to their black and Hispanic counterparts, white female adolescents had a higher proportion of mothers who attended college (53.2% vs. 35.8% and 33.3% of white, black and Hispanic mothers completed some college or more, respectively) and lived in households with higher income ($36,517 vs. $18,897 and $25,097 for white, black and Hispanic households, respectively). In addition, compared to blacks and Hispanics, more white females lived in the rural areas and in the North Central part of the U.S. and lived in states with lower adolescent pregnancy rates. Compared to whites, more black females came from the South and were less likely to reside in suburban areas.

Table XVIII shows the summary statistics for the male adolescent sample (12-14 years old) used in estimating the probability of early sexual debut. Overall, 13.1% of male adolescents became sexually active between the ages of 12-14, with significantly more black adolescents (27.7%) doing so when compared to their white (10.2%) and Hispanic (17.6%) counterparts.

The majority of male adolescents (81.1%) had normal weight status. On average, approximately 2% of the male adolescents were underweight and approximately 16% were overweight. Compared to their white counterparts (22.4%) fewer black (14.2%) and Hispanic (30.0%) males perceived their weight as overweight. In addition, fewer black males (4.1%) misperceived their weight as higher than their CDC-defined weight status, as compared to their white (8.9%) and Hispanic (9.5%) counterparts. More black males (43.0%) misperceived their weight as lower as compared to their white (35.1%) and Hispanic (30.1%) counterparts.

Compared to their black and Hispanic counterparts, white males scored higher on the PIAT math test (106.2, 91.2, and 95.9 PIAT math scores for white, black, and Hispanic males, respectively), scored higher on the substance use index (1.0, 0.7, and 0.9 scores for white, black and Hispanic males, respectively), and had more dating partners in the previous year (3.0, 2.7, and 2.7 dating partners for white, black, and Hispanic females, respectively). In addition, compared to their black counterparts, white and Hispanic males were less likely to live in one parent households (18.3%, 57.5%, and 27.0% white, black, and Hispanic males, respectively) and had lower scores on the behavior problem index (1.7, 2.2, and 1.8 for white, black, and Hispanic males, respectively) .

Compared to their black and Hispanic counterparts, white male adolescents had a higher proportion of mothers who attended college (58.3% vs. 41.6% and 27.0% of white, black and Hispanic mothers completed some college or more, respectively) and lived in households with

Table XVIII: Summary Statistics—Male Adolescents: Means (Standard Errors) and Frequencies

	All	White	Black	Hispanic
Outcome Variable				
Ever Had Sex	13.07%	10.23%	27.74%[1]	17.62%[1,2]
Weight Measures				
Underweight	2.43%	2.37%	3.59%	1.06%
Normal Weight	81.11%	81.26%	78.82%	83.63%
Overweight	16.46%	16.36%	17.60%	15.31%
Perceived Underweight	17.75%	18.81%	16.88%	11.19%[1]
Perceived Normal	59.95%	58.75%	68.93%[1]	58.80%
Perceived Overweight	22.30%	22.44%	14.19%[1]	30.01%[1,2]
Misperceived Heavier	8.38%	8.88%	4.14%[1]	9.47%[2]
Correctly Perceived	56.12%	56.00%	52.83%	60.40%[2]
Misperceived Skinnier	35.51%	35.12%	43.02%[1]	30.14%[2]
Youth Characteristics				
White	76.99%			
Black	11.95%			
Hispanic	11.06%			
Age	13.42 (0.02)	13.42 (0.02)	13.37 (0.05)	13.43 (0.04)
PIAT math	103.23 (0.48)	106.15 (0.54)	91.16 (1.17)[1]	95.92 (1.21)[1,2]
Excellent Health	42.03%	42.75%	43.70%	35.01%[1]
Good Health	19.82%	18.80%	20.07%	26.27%[1]
Age Puberty	11.48 (0.03)	11.49 (0.03)	11.28 (0.06)[1]	11.60 (0.07)[2]
Lives With One Parent	24.05%	18.32%	57.54%[1]	26.98%[1,2]
Youth Works	24.12%	25.63%	17.69%[1]	21.31%
Behavior Problem Scale	1.82 (0.05)	1.74 (0.06)	2.23 (0.12)[1]	1.82 (0.11)[2]
Substance Use Scale	0.95 (0.03)	1.02 (0.04)	0.66 (0.06)[1]	0.85 (0.07)[1,2]
Delinquency Scale	1.31 (0.05)	1.31 (0.06)	1.28 (0.11)	1.31 (0.13)
Depressed	6.41%	5.45%	15.09%[1]	3.71%[2]
No Religion	11.01%	11.50%	11.52%	7.34%[1,2]
Number of Dates	2.87 (0.04)	2.92 (0.04)	2.72 (0.09)[1]	2.70 (0.08)[1]
Parental Characteristics				
Mother Less Than High School	14.30%	8.84%	23.72%[1]	42.25%[1,2]
Mother High School	32.76%	32.85%	34.66%	30.73%
Mother More Than High School	52.94%	58.31%	41.62%[1]	27.02%[1,2]
Parental Income ($1982-84)	35953.61 (1022.07)	40980.47 (1264.40)	16134.93[1] (1093.17)	22422.58[1,2] (1621.80)
Mother Full Time Employed	63.15%	64.04%	66.18%	52.50%[1,2]
Mother Part Time Employed	19.10%	20.29%	16.68%	13.94%
Mother Does Not Work	17.75%	15.67%	17.13%	33.56%[1,2]

(Continued)

Table XVIII Continued

	All	White	Black	Hispanic
Place of Residence				
Urban Residence	71.87%	67.90%	81.21%[1]	89.29%[1]
Suburban Residence	11.32%	13.18%	3.48%[1]	7.16%[1]
Rural Residence	16.81%	18.92%	15.31%	3.56%[1,2]
Northeast	17.20%	17.79%	13.82%	15.74%
North Central	27.54%	30.23%	26.03%	10.86%[1,2]
West	21.53%	20.15%	8.95%[1]	46.42%[1,2]
South	33.74%	31.83%	51.21%[1]	26.98%[2]
Youth-Parent Relationship				
Autonomy and Control Index	2.59 (0.04)	2.57 (0.05)	2.71 (0.10)	2.54 (0.09)
Family Routine Index	11.16 (0.15)	11.05 (0.18)	11.58 (0.42)	11.56 (0.38)
State-Level Controls For Adolescent Pregnancy				
Birth Rates[a]	90.87 (0.50)	88.72 (0.61)	94.61 (0.84)[1]	101.96 (1.07)[1,2]
Abortion Provider[b]	73.89(0.67)	75.38 (0.79)	75.80 (1.35)	60.52 (1.82)[1,2]
N	1407	866	276	255

Note: Summary statistics are weighted using NLSY sampling weights. [1] Statistically different than whites at P<0.05. [2] Statistically different than blacks at P<0.05. .[a] Number of pregnancies per 1,000 women aged between 15-19 years old. [b] Percentages of counties in the state not having an abortion provider.

higher income ($40,980 vs. $16,134 and $22,422 for white, black and Hispanic households, respectively). Hispanic males had significantly higher frequencies of non working mothers (33.6%) as compared to their white (15.7%) and black (17.1%) counterparts. In addition, compared to whites and blacks, more Hispanic males lived in the West part of the U.S. and lived in states with higher adolescent pregnancy rates.

Risky Sexual Behaviors

Table XIX shows the summary statistics for the female sample used to investigate the relationship between measures of weight and risky sexual behaviors. On average, female adolescents had approximately 2 sexual partners in the previous year, with no significant differences among racial/ethnic groups. However, when looking at contraceptive use frequencies, white female adolescents used contraceptives approximately 44 out of the 55 times they had sex (80.2%), while the other two racial/ethnic groups had significantly lower frequency of contraceptive use proportional to the times they had sex (69.2% and 70.1% for black and Hispanic females, respectively).

On average, the majority of adolescents were normal weight, with significantly lower proportions of black females (53%) being normal weight as compared to their white (80.5%) and Hispanic (80.4%) counterparts. Close to two and a half times as many black females (44.5%) were overweight when compared to their white (15.5%) and Hispanic (18.3%) counterparts. More white females perceived their weight as underweight than their black and Hispanic counterparts. Significantly more black females perceived their weight as overweight as compared to their white and Hispanic counterparts (45.4% vs. 39.4% and 35.5% of black, white and Hispanic females, respectively). However, when looking at the accuracy of weight perceptions, twice as many black females (28%) misperceived their weight as skinnier when compared to

Table XIX: Summary Statistics Female Adolescents-Frequencies and Means (Standard Errors)

	All	White	Black	Hispanic
Number of Sex Partners	2.11 (0.05)	2.18 (0.08)	2.08 (0.09)	1.92 (0.13)
Times Contraceptives Used	34.61 (1.34)	44.12 (2.07)	18.39 (1.52)[1]	30.46 (3.07)[1,2]
Times Sex Last Year	45.13 (1.52)	55.02 (2.27)	26.58 (1.98)[1]	43.48 (3.53)[1,2]
Underweight	3.12%	4.01%	2.48%	1.32%[1]
Normal Weight	72.83%	80.45%	52.98%[1]	80.42%[2]
Overweight	24.05%	15.54%	44.54%[1]	18.25%[2]
Perceived Underweight	8.72%	9.77%	7.45%[1]	7.41%[1]
Perceived Normal	50.94%	50.88%	47.19%	57.14%[2]
Perceived Overweight	40.34%	39.35%	45.36%[1]	35.45%[2]
Misperceived Heavier	22.81%	27.57%	13.91%[1]	21.96%[1,2]
Correctly Perceived	61.17%	61.32%	58.11%[1]	65.61%[2]
Misperceived Skinnier	16.02%	11.11%	27.98%[1]	12.43%[2]
White	54.93%			
Black	27.72%			
Hispanic	17.35%			
Youth Works	76.41%	80.87%	69.87%[1]	72.75%[1]
PIAT Math	97.23 (0.38)	102.48 (0.47)	89.47 (0.72)[1]	93.00 (0.82)[1,2]
Excellent Health	25.42%	24.31%	26.16%	27.78%
Good Health	39.19%	39.01%	40.89%	37.04%
Lives One Parent	38.14%	30.16%	58.77%[1]	30.42%[2]
Substance Use Index	1.67 (0.02)	1.99 (0.03)	1.08 (0.04)[1]	1.62 (0.06)[1,2]
Delinquency Index	0.71 (0.03)	0.82 (0.04)	0.48 (0.04)[1]	0.72 (0.07)[2]
Depressed	9.82%	8.10%	11.26%[1]	12.96%[1]
Number of Dates	4.05 (0.03)	4.33 (0.03)	3.51 (0.06)[1]	4.06 (0.06)[1,2]
Mother Less Than High School	20.61%	12.78%	22.52%[1]	42.33%[1,2]
Mother High School	36.53%	36.42%	40.56%[1]	30.42%[2]
Mother More Than High School	42.86%	50.79%	36.92%[1]	27.25%[1,2]
Mother Not Work	20.84%	18.13%	24.67%[1]	23.28%[1]
Mother Part Time	11.98%	11.45%	11.09%	15.08%[2]
Mother Full Time	67.19%	70.43%	64.24%[1]	61.64%[1]
Parental Income ($1982-84)	26676.93 (522.03)	32471.44 (776.93)	18154.83[1] (836.90)	21944.97[1,2] (1282.67)
Abortion Clinics[a]	74.67 (0.51)	76.57 (0.65)	78.20 (0.89)	62.99 (1.35)[1,2]
Birth Rates[b]	83.44 (0.34)	78.75 (0.47)	87.59 (0.54)[1]	91.66 (0.71)[1,2]
N	2,179	1,197	604	378

Note: [1] Statistically different than whites at P<0.05. [2] Statistically different than blacks at P<0.05
[a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old.

their white (11.1%) and Hispanic (12.4%) counterparts. In contrast, almost twice as many white females (27.6%) misperceived their weight as heavier when compared to their black counterparts (13.9%).

On average, more white females reported working, had higher PIAT math scores, higher scores on the substance use index, had higher number of dates, and had lower incidence of reported depression than their black and Hispanic counterparts. In addition, on average, white females reported higher parental SES as measured by parental income and frequency of mothers completing some college or more as compared to their black and Hispanic counterparts (parental income of $32,471 vs. $18,154, and $21,945 for white, black and Hispanic females, respectively and 50.8% vs. 36.9% and 27.3% of white, black and Hispanic mothers with some college or more education, respectively). In addition, Hispanic females lived in states that had higher proportion of abortion providers and higher adolescent birth rates than their white and black counterparts.

Table XX shows the summary statistics for the male sample used to investigate the relationship between measures of weight and risky sexual behaviors. On average, black male adolescents had significantly more sex partners (4.5) than their white (3.4) counterparts, while Hispanic males had on average approximately 4 sex partners. White male adolescents used contraceptives approximately 44 out of the 56 times they had sex (78.6%), black males used contraceptives approximately 20 out of 28 times (71.4%) and Hispanic males used contraceptives approximately 29 out of 42 times (69.0%).

On average, the majority of male adolescents were normal weight. Significantly more black (30.9%) and Hispanic (32.2%) of the male adolescents were overweight when compared to their white (24.3%) counterparts. More black males perceived their weight as normal and

Table XX: Summary Statistics Male Adolescents-Frequencies and Means (Standard Errors)

	All	White	Black	Hispanic
Number of Sex Partners	3.87 (0.11)	3.36 (0.16)	4.53 (0.20)[1]	3.98 (0.25)
Times Contraceptives Used	32.95 (1.45)	44.06 (2.53)	19.66 (1.54)[1]	29.23 (3.12)[1,2]
Times Had Sex	43.77 (1.48)	55.93 (2.44)	28.07 (1.97)[1]	41.54 (3.18)[1,2]
Underweight	1.60%	1.92%	0.82%	2.13%
Normal Weight	70.34%	73.83%	68.27%	65.70%[1]
Overweight	28.06%	24.25%	30.91%[1]	32.17%[1]
Perceived Underweight	15.47%	15.30%	16.04%	14.92%
Perceived Normal	66.76%	66.39%	70.26%[1]	61.82%[2]
Perceived Overweight	17.77%	18.31%	13.70%[1]	23.26%[1,2]
Misperceived Heavier	5.46%	6.10%	3.40%[1]	7.36%[2]
Correctly Perceived	59.59%	63.80%	54.80%[1]	57.75%
Misperceived Skinnier	34.96%	30.10%	41.80%[1]	34.88%[2]
White	46.50%			
Black	33.18%			
Hispanic	20.32%			
Youth Works	74.63%	85.03%	62.53%[1]	70.54%[1,2]
PIAT Math	95.10 (0.36)	101.33 (0.51)	88.82 (0.58)[1]	91.03 (0.75)[1,2]
Excellent Health	39.95%	36.96%	45.32%[1]	37.98%[2]
Good Health	25.99%	25.08%	25.64%	28.68%
Lives One Parent	36.05%	26.42%	51.41%[1]	32.95%[1,2]
Substance Use Index	1.63 (0.02)	1.95 (0.03)	1.19 (0.04)[1]	1.61(0.05)[1,2]
Delinquency Index	1.32 (0.04)	1.46 (0.06)	1.12 (0.06)[1]	1.31 (0.08)
Depressed	6.98%	6.10%	8.31%[1]	6.78%
Number of Dates	8.39 (0.71)	8.92 (0.70)	4.83 (0.34)[1]	13.06 (3.06)[1,2]
Mother Less Than High School	26.07%	13.88%	27.75%[1]	51.55%[1,2]
Mother High School	37.30%	41.22%	38.41%	26.36%[1,2]
Mother More Than High School	36.63%	44.90%	33.84%[1]	22.09%[1,2]
Mother Not Work	23.69%	16.89%	26.46%[1]	34.88%[1,2]
Mother Part Time	11.57%	12.37%	9.95%	12.40%
Mother Full Time	64.73%	70.74%	63.58%[1]	52.71%[1,2]
Parental Income ($1982-84)	25759.46 (540.29)	35080.64 (891.41)	16625.13[1] (673.42)	19272.23[1,2] (986.01)
Abortion Clinics[a]	74.94 (0.47)	76.67 (0.65)	79.20 (0.70)[1]	63.87 (1.20)[1,2]
Birth Rates[b]	84.83 (0.33)	77.91 (0.49)	89.58 (0.44)[1]	93.04 (0.62)[1,2]
N	2,574	1,197	854	523

Note: [1] Statistically different than whites at P<0.05. [2] Statistically different than blacks at P<0.05
[a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old.

misperceived their weight as skinnier than their white and Hispanic counterparts (70.3%, 66.4% and 61.8% of black, white and Hispanic males perceived their weight normal respectively, and 41.8%, 30.1%, and 34.9% of black, white and Hispanic males misperceived their weight as skinnier, respectively).

On average, white males had higher frequencies of working (85.0%), higher PIAT math scores (101.3), higher scores on the substance use index (2.0), higher scores on the delinquency index (1.5), and resided in higher proportions in high SES households (44.9% mothers completed some college or more and $35, 081 average parental income) when compared to their black counterparts (62.5% working, 88.8 PIAT math scores, 1.2 score on substance use index, 1.1 score on delinquency index, 33.8% mothers completed some college or more, and $16,625 parental income) and Hispanic counterparts (70.5% working, 91.0 PIAT math scores, 1.6 score on substance use index, 1.3 score on delinquency index, 22.1% mothers completed some college or more, and $19,272 parental income). In addition, Hispanic males lived in states that had a higher proportion of abortion providers and higher adolescent birth rates than their white and black counterparts.

Regression Results

All analyses of risky sexual behaviors were undertaken separately by gender. In addition to examining the model using the entire sample, each analysis was rerun separately for each racial/ethnic group. In other words, each gender-specific analysis was run using: the whole sample, the white sample only, the black sample only, and the Hispanic sample only.

To control for possible endogeneity issues, two different models were examined in every sample and subsample. Model 1 included only covariates that were considered exogenous such

as race, age of puberty onset, health status, youth's living arrangements, parental SES, youth-parental relationship, and state-level controls for liberal vs. conservative attitudes toward adolescent abortion and sexual activity. Model 2 contained all the covariates examined in Model 1, but also added the following potentially endogenous covariates related to personal choices: indexes for behavior problems, measures of delinquency and substance use, no religious affiliation, number of dating partners in the previous year, and a depression indicator. These choice variables were shown to be significantly related with early sexual debut by the previous literature (Biglan et al., 1990; King et al., 2012; Leherer et al., 2006; Mason et al., 2010; Price and Hyde, 2009).

Overall, the results were generally consistent across models and had robust estimates. Thus, it appears that endogeneity of these choice variables may not have been a major issue in this study. However, both models are shown for comparison.

Early Sexual Debut

Female Adolescents

Table XXI shows the estimated effects of actual weight status on early sexual debut for female adolescents. Excepting for white females in Model 2, there was no statistically significant association between females' actual weight status and early sexual debut for any of the models and groups analyzed. Model 2 showed that white overweight females have 5.9% lower odds of early sexual debut as compared to their normal weight counterparts.

Table XXI shows that for white female adolescents, higher scores on the social behavior and substance use indexes and higher number of dates was significantly associated with higher odds of early sexual debut. For black female adolescents, only the behavior problems index and the substance use index were significantly associated with higher odds of earlier sexual debut.

For Hispanic female adolescents, the substance use index and the number of dates were significantly associated with higher odds of early sexual debut while being depressed was associated with 2.8% lower odds of early sexual debut.

For black females, higher scores on the PIAT math were associated with lower odds of early sexual debut. Surprisingly, for black females, having a mother that completed high school or more was associated with increased odds of early sexual debut, while having a working mother was a protective factor. For white females, parental income was a protective factor against early sexual debut, and for Hispanic adolescents, living in a state with high teenage pregnancy rates, was also a protective factor.

Table XXI: Effect of Female Actual Weight on Early Sexual Debut: Probit Results-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	0.990	0.966	1.033	1.001	0.965	0.923	0.997	0.981
	(0.016)	(0.030)	(0.046)	(0.064)	(0.023)	(0.071)	(0.006)	(0.022)
Overweight	0.985	0.969	0.979	0.941***	0.993	0.963	0.998	1.030
	(0.013)	(0.032)	(0.014)	(0.021)	(0.024)	(0.074)	(0.005)	(0.054)
Choice Variables								
Behavior		1.017***		1.013**		1.041*		1.004
Problems Index		(0.006)		(0.007)		(0.025)		(0.005)
Substance		1.056***		1.052***		1.102***		1.029***
Index		(0.010)		(0.012)		(0.034)		(0.010)
Delinquency		1.014**		1.012*		0.978		1.007
Index		(0.007)		(0.007)		(0.031)		(0.008)
Depressed		0.997		1.006		1.051		0.972**
		(0.031)		(0.037)		(0.124)		(0.013)
No Religion		0.999		0.991		1.031		1.073
		(0.029)		(0.028)		(0.144)		(0.093)
Number of		1.030***		1.029***		1.009		1.016*
Dates		(0.008)		(0.009)		(0.022)		(0.008)
Youth Characteristics								
Black	0.992	1.083**						
	(0.011)	(0.041)						
Hispanic	0.982	0.983						
	(0.011)	(0.024)						
Age Puberty	0.988***	0.982**	0.990***	0.987	0.982**	0.948**	0.995	0.977***
	(0.003)	(0.007)	(0.004)	(0.008)	(0.008)	(0.021)	(0.004)	(0.008)
Lives 1 Parent	1.031**	1.056**	1.025	1.048	1.039*	1.095	1.004	0.995
	(0.013)	(0.028)	(0.016)	(0.031)	(0.022)	(0.072)	(0.006)	(0.021)
Works	1.027*	1.035	1.025	1.020	1.074*	1.197**	1.000	1.009
	(0.015)	(0.027)	(0.018)	(0.030)	(0.043)	(0.110)	(0.005)	(0.026)
PIAT math	0.999***	0.999	0.999**	1.000	0.998***	0.995**	1.000	1.000
	(0.0003)	(0.001)	(0.0003)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.001)
Excellent	0.987	0.981	0.982*	0.973	0.999	0.950	1.007	1.026
Health	(0.010)	(0.021)	(0.011)	(0.022)	(0.025)	(0.065)	(0.009)	(0.032)
Good Health	1.030**	1.033	1.027*	1.043	1.033	0.941	1.007	1.005
	(0.014)	(0.028)	(0.016)	(0.034)	(0.026)	(0.067)	(0.009)	(0.021)
Parental Characteristics								
Parental	0.997	0.994	0.995**	0.991*	0.998	0.993	1.001	1.000
Income [a]	(0.002)	(0.005)	(0.002)	(0.005)	(0.004)	(0.016)	(0.001)	(0.003)
Mother High	1.007	1.011	0.997	0.993	1.041	1.219**	1.004	0.995
School	(0.014)	(0.032)	(0.016)	(0.034)	(0.029)	(0.119)	(0.008)	(0.021)
Mother More	1.009	1.000	1.005	0.982	1.016	1.221*	1.002	1.001
High School	(0.014)	(0.029)	(0.016)	(0.032)	(0.035)	(0.144)	(0.006)	(0.025)

(Continued)

Table XXI Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	0.987	0.933**	0.987	0.942	0.976	0.792**	1.004	1.014
Full Time	(0.012)	(0.032)	(0.014)	(0.035)	(0.024)	(0.078)	(0.006)	(0.022)
Mother Works	0.966***	0.927***	0.965***	0.929***	0.975	0.871**	1.002	1.051
Part Time	(0.010)	(0.022)	(0.011)	(0.022)	(0.024)	(0.056)	(0.006)	(0.044)
Youth-Parent Relationship								
Autonomy	0.991***	1.005	0.992**	1.005	0.985**	0.975	0.999	1.007
Index	(0.003)	(0.008)	(0.003)	(0.008)	(0.007)	(0.022)	(0.001)	(0.008)
Family Routine	0.997***	1.000	0.997***	1.001	0.998	0.998	1.000	0.997
Index	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.005)	(0.0005)	(0.002)
Place of Residence								
Suburban	1.014	1.031	1.014	1.025	1.045	1.430**	1.002	1.033
	(0.017)	(0.037)	(0.020)	(0.042)	(0.055)	(0.242)	(0.007)	(0.046)
Rural	0.979**	0.967	0.977**	0.955**	1.014	1.132	0.998	0.992
	(0.009)	(0.020)	(0.010)	(0.019)	(0.031)	(0.118)	(0.005)	(0.025)
Northeast	0.981	0.950*	0.972**	0.947*	1.043	1.065	0.993	0.966*
	(0.015)	(0.029)	(0.014)	(0.028)	(0.055)	(0.141)	(0.006)	(0.020)
North Central	0.970***	0.935***	0.962***	0.940**	1.037	1.020	0.996	0.952***
	(0.010)	(0.021)	(0.012)	(0.024)	(0.035)	(0.100)	(0.004)	(0.018)
West	0.969***	0.920***	0.968***	0.925***	1.019	0.941	0.995	0.962
	(0.011)	(0.019)	(0.010)	(0.019)	(0.047)	(0.086)	(0.006)	(0.027)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.000	1.001	1.000	0.998***
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)
Abortion[c]	1.000	0.999	1.000	0.999	1.000	1.000	1.000	1.000
Provider	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.001)
N	2,507	1,090	1,335	637	653	215	519	238

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider

Table XXII shows the estimated association between perceptions of weight and early sexual debut for female adolescents. For white females, adolescents who perceived themselves as being overweight had 4.7% lower odds of early sexual debut. No significant relationship between weight perceptions and early sexual debut were found for black and Hispanic females. Similar with the findings from table XXI (association between actual weight and sexual debut), high scores on the substance use index was a risk factor for all three racial/ethnic groups. High scores on the behavior problems index and delinquency index as well as increased number of dates were risk factors only for white females. Being depressed was associated with 2.8% lower odds of early sexual debut for Hispanic females. As was the case for actual weight, for black adolescents, having a mother who completed high school as well as living in a single parent household were associated with increased odds of early sexual debut. Having a mother that works and increased scores on the PIAT math test were protective factors for black females. In addition, parental income was a protective factor for white females.

Table XXIII shows the estimated associations of weight misperceptions and early sexual debut. No significant results were found for either of the 4 categories analyzed (whole sample, white females only, black females only and Hispanic females only). The estimated results for the rest of the covariates were very similar with those from Tables XXI and XXII.

Table XXII: Effect of Female Perceived Weight on Early Sexual Debut: Probit Results-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	0.991	0.974	0.994	0.978	0.973	0.904	1.000	1.031
Underweight	(0.013)	(0.026)	(0.014)	(0.027)	(0.025)	(0.068)	(0.007)	(0.056)
Perceived	0.986	0.962**	0.984*	0.953**	0.992	0.994	0.998	1.013
Overweight	(0.009)	(0.018)	(0.009)	(0.018)	(0.022)	(0.062)	(0.004)	(0.022)
Choice Variables								
Behavior		1.017***		1.013**		1.036		1.004
Problems Index		(0.006)		(0.006)		(0.025)		(0.006)
Substance		1.055***		1.050***		1.104***		1.028**
Index		(0.010)		(0.012)		(0.034)		(0.012)
Delinquency		1.015**		1.015**		0.983		1.010
Index		(0.007)		(0.007)		(0.032)		(0.009)
Depressed		1.004		1.015		1.068		0.972*
		(0.032)		(0.040)		(0.133)		(0.016)
No Religion		0.998		0.991		1.064		1.056
		(0.028)		(0.027)		(0.148)		(0.086)
Number of		1.030***		1.028***		1.010		1.015
Dates		(0.008)		(0.009)		(0.022)		(0.010)
Youth Characteristics								
Black	0.989	1.071*						
	(0.010)	(0.041)						
Hispanic	0.980*	0.978						
	(0.011)	(0.023)						
Age Puberty	0.987***	0.981***	0.989***	0.985*	0.982**	0.947**	0.995	0.976***
	(0.003)	(0.007)	(0.004)	(0.008)	(0.008)	(0.021)	(0.004)	(0.009)
Lives 1 Parent	1.030**	1.054**	1.025	1.044	1.037*	1.090	1.004	0.997
	(0.013)	(0.027)	(0.016)	(0.031)	(0.022)	(0.072)	(0.006)	(0.022)
Works	1.027*	1.032	1.026	1.020	1.071*	1.204**	0.999	1.016
	(0.015)	(0.027)	(0.018)	(0.029)	(0.042)	(0.110)	(0.004)	(0.032)
PIAT math	0.999***	1.000	0.999**	1.000	0.998***	0.995**	1.000	1.000
	(0.0003)	(0.001)	(0.0003)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.001)
Excellent	0.987	0.981	0.982*	0.974	1.000	0.945	1.007	1.027
Health	(0.010)	(0.021)	(0.011)	(0.022)	(0.025)	(0.063)	(0.009)	(0.032)
Good Health	1.031**	1.037	1.029*	1.046	1.034	0.939	1.007	1.002
	(0.014)	(0.029)	(0.016)	(0.035)	(0.027)	(0.068)	(0.009)	(0.021)
Parental Characteristics								
Parental	0.996	0.993	0.995**	0.990*	0.998	0.994	1.001	1.000
Income[a]	(0.002)	(0.005)	(0.002)	(0.005)	(0.004)	(0.016)	(0.001)	(0.002)
Mother High	1.007	1.008	0.998	0.992	1.040	1.210*	1.004	0.992
School	(0.014)	(0.031)	(0.016)	(0.033)	(0.029)	(0.119)	(0.008)	(0.020)
Mother More	1.009	0.998	1.006	0.981	1.019	1.229*	1.003	1.001
High School	(0.014)	(0.028)	(0.016)	(0.031)	(0.036)	(0.145)	(0.007)	(0.025)

(Continued)

Table XXII Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	0.987	0.937*	0.987	0.947	0.972	0.786**	1.004	1.008
Full Time	(0.012)	(0.031)	(0.013)	(0.034)	(0.024)	(0.077)	(0.006)	(0.023)
Mother Works	0.966***	0.930***	0.966***	0.933***	0.973	0.879*	1.003	1.051
Part Time	(0.010)	(0.022)	(0.011)	(0.022)	(0.024)	(0.058)	(0.007)	(0.045)
Youth-Parent Relationship								
Autonomy	0.991***	1.004	0.992**	1.005	0.984**	0.978	0.999	1.006
Index	(0.003)	(0.008)	(0.003)	(0.008)	(0.007)	(0.022)	(0.001)	(0.008)
Family Routine	0.997***	1.000	0.997***	1.001	0.998	0.998	0.999	0.997
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.005)	(0.0005)	(0.003)
Place of Residence								
Suburban	1.015	1.031	1.016	1.028	1.052	1.414**	1.001	1.039
	(0.017)	(0.036)	(0.020)	(0.041)	(0.057)	(0.245)	(0.007)	(0.049)
Rural	0.980**	0.970	0.978**	0.960**	1.015	1.122	0.999	0.992
	(0.009)	(0.021)	(0.010)	(0.019)	(0.031)	(0.114)	(0.005)	(0.025)
Northeast	0.982	0.951*	0.972**	0.950*	1.052	1.072	0.993	0.966*
	(0.015)	(0.029)	(0.014)	(0.028)	(0.058)	(0.145)	(0.006)	(0.019)
North Central	0.970***	0.937***	0.963***	0.943**	1.038	1.025	0.996	0.951**
	(0.010)	(0.021)	(0.011)	(0.023)	(0.036)	(0.101)	(0.004)	(0.022)
West	0.970***	0.923***	0.969***	0.931***	1.017	0.949	0.995	0.962
	(0.011)	(0.019)	(0.010)	(0.019)	(0.046)	(0.089)	(0.007)	(0.027)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.000	1.001	1.000	0.998***
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)
Abortion[c]	1.000	0.999	1.000	0.999	1.000	1.001	1.000	1.000
Provider	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.001)
N	2,507	1,090	1,335	637	653	215	519	238

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$

Table XXIII: Effect of Female Misperceived Weight on Early Sexual Debut: Probit Results-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived	1.000	0.976	0.998	0.970	0.996	1.026	1.003	1.058
Heavier	(0.011)	(0.020)	(0.011)	(0.019)	(0.032)	(0.098)	(0.006)	(0.044)
Misperceived	0.999	0.983	0.998	0.989	1.000	0.921	1.003	1.050
Skinnier	(0.011)	(0.024)	(0.014)	(0.029)	(0.022)	(0.061)	(0.006)	(0.048)
Choice Variables								
Behavior		1.017***		1.013**		1.038		1.003
Problems Index		(0.006)		(0.006)		(0.024)		(0.006)
Substance		1.055***		1.049***		1.101***		1.027**
Index		(0.010)		(0.012)		(0.034)		(0.011)
Delinquency		1.014**		1.013*		0.984		1.011
Index		(0.007)		(0.007)		(0.031)		(0.009)
Depressed		1.000		1.010		1.051		0.976
		(0.031)		(0.038)		(0.125)		(0.015)
No Religion		1.000		0.994		1.046		1.030
		(0.029)		(0.028)		(0.148)		(0.064)
Number of		1.031***		1.030***		1.010		1.014
Dates		(0.008)		(0.009)		(0.022)		(0.010)
Youth Characteristics								
Black	0.990	1.076*						
	(0.011)	(0.041)						
Hispanic	0.981*	0.979						
	(0.011)	(0.023)						
Age Puberty	0.988***	0.982**	0.990**	0.988	0.981**	0.944***	0.995	0.980**
	(0.003)	(0.007)	(0.004)	(0.008)	(0.008)	(0.021)	(0.004)	(0.008)
Lives 1 Parent	1.031**	1.055**	1.026*	1.046	1.038*	1.083	1.004	1.001
	(0.013)	(0.027)	(0.016)	(0.031)	(0.022)	(0.072)	(0.006)	(0.020)
Works	1.027*	1.035	1.025	1.019	1.071*	1.216**	1.000	1.020
	(0.015)	(0.027)	(0.018)	(0.029)	(0.043)	(0.110)	(0.005)	(0.032)
PIAT math	0.999***	1.000	0.999**	1.000	0.998***	0.995**	1.000	1.000
	(0.0003)	(0.001)	(0.0003)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.0005)
Excellent	0.987	0.980	0.982*	0.973	0.999	0.936	1.007	1.027
Health	(0.010)	(0.021)	(0.011)	(0.022)	(0.025)	(0.065)	(0.009)	(0.032)
Good Health	1.029**	1.032	1.027*	1.043	1.032	0.939	1.007	1.001
	(0.014)	(0.028)	(0.016)	(0.034)	(0.027)	(0.067)	(0.009)	(0.019)
Parental Characteristics								
Parental	0.996	0.993	0.995**	0.990*	0.998	0.992	1.001	1.000
Income[a]	(0.002)	(0.005)	(0.002)	(0.005)	(0.004)	(0.017)	(0.001)	(0.002)
Mother High	1.007	1.008	0.998	0.993	1.040	1.204*	1.004	0.990
School	(0.014)	(0.031)	(0.016)	(0.034)	(0.029)	(0.115)	(0.008)	(0.018)
Mother More	1.008	0.997	1.006	0.982	1.019	1.206	1.003	0.998
High School	(0.014)	(0.029)	(0.016)	(0.032)	(0.036)	(0.138)	(0.007)	(0.022)

(Continued)

Table XXIII Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	0.986	0.934**	0.986	0.942	0.973	0.792**	1.003	1.009
Full Time	(0.012)	(0.032)	(0.014)	(0.034)	(0.025)	(0.076)	(0.006)	(0.021)
Mother Works	0.966***	0.928***	0.965***	0.930***	0.974	0.875**	1.002	1.065
Part Time	(0.010)	(0.022)	(0.011)	(0.021)	(0.025)	(0.056)	(0.006)	(0.051)
Youth-Parent Relationship								
Autonomy	0.991***	1.005	0.993**	1.007	0.984**	0.979	0.999	1.005
Index	(0.003)	(0.008)	(0.003)	(0.008)	(0.007)	(0.022)	(0.001)	(0.007)
Family Routine	0.997***	1.000	0.997***	1.002	0.998	0.998	0.999	0.997
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.005)	(0.0005)	(0.002)
Place of Residence								
Suburban	1.015	1.033	1.016	1.028	1.048	1.439**	1.001	1.025
	(0.017)	(0.037)	(0.020)	(0.042)	(0.056)	(0.242)	(0.007)	(0.043)
Rural	0.980**	0.970	0.978**	0.960**	1.016	1.103	0.999	0.998
	(0.009)	(0.021)	(0.010)	(0.019)	(0.032)	(0.112)	(0.006)	(0.027)
Northeast	0.982	0.952	0.972**	0.952*	1.047	1.054	0.993	0.967*
	(0.015)	(0.029)	(0.014)	(0.029)	(0.057)	(0.137)	(0.006)	(0.018)
North Central	0.970***	0.938***	0.964***	0.946**	1.038	1.027	0.995	0.953**
	(0.010)	(0.021)	(0.012)	(0.024)	(0.036)	(0.100)	(0.004)	(0.022)
West	0.970***	0.923***	0.968***	0.932***	1.016	0.940	0.995	0.965
	(0.011)	(0.019)	(0.010)	(0.019)	(0.047)	(0.087)	(0.007)	(0.027)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.000	1.001	1.000	0.998***
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0002)	(0.001)
Abortion[c]	1.000	0.999	1.000	0.999	1.000	1.000	1.000	1.000
Providers	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.0001)	(0.001)
N	2,499	1,088	1,331	636	652	215	516	237

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Male Adolescents

Turning to the results for male adolescents, table XXIV shows the estimated associations between actual weight status and early sexual debut. Results show that for Hispanic males, being overweight was associated with 2.7% lower odds of earlier sexual debut. For black males, Model 1 who did not control for the choice variables showed that being underweight was associated with 11.2% lower odds of early sexual debut. This effect disappeared once the choice variables were introduced in Model 2.

Higher scores on the behavior problems index were associated with higher odds of early sexual debut for white and Hispanic, but not for black adolescents. In addition, higher scores on the substance use index and the delinquency index were associates with increased odds of early sexual debut for white adolescents. For all racial/ethnic groups increased number of dates was associated with higher odds of early sexual debut. Hispanic males who reported no religious affiliation had 3.3% lower odds of early sexual debut. Looking at youth characteristics, higher PIAT math scores were protective factors for white and black but not for Hispanic adolescents. For Hispanics, reporting excellent health was a protective factor against early sexual debut and reporting good health was a risk factor.

Parental income was a protective factor for white males. Having a mother that completed high school was associated with 14.3% and 6.8% lower odds of early sexual debut for black and Hispanic males, respectively, and having a mother that completed more than high school was associated with 17.6% lower odds of early sexual debut for black males only. In addition, higher family involvement in youth's life was unexpectedly associated with 0.6% higher odds of early sexual debut for Hispanic males.

Table XXIV: Effects of Male Actual Weight on Early Sexual Debut: Probit Results-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	0.984	1.011	0.994	1.020	0.888***	0.915	1.039	1.106
	(0.015)	(0.029)	(0.026)	(0.049)	(0.029)	(0.068)	(0.034)	(0.072)
Overweight	1.000	0.993	0.999	0.987	1.043	1.069	0.965*	0.973**
	(0.014)	(0.018)	(0.014)	(0.017)	(0.049)	(0.093)	(0.020)	(0.013)
Choice Variables								
Behavior		1.011**		1.010**		1.022		1.009*
Problems Index		(0.004)		(0.004)		(0.018)		(0.005)
Substance		1.036***		1.027***		1.050		1.004
Index		(0.008)		(0.008)		(0.038)		(0.009)
Delinquency		1.017***		1.014***		1.032		1.008
Index		(0.005)		(0.005)		(0.023)		(0.006)
Depressed		0.963**		0.977		0.909		
		(0.017)		(0.018)		(0.074)		
No Religion		1.003		1.010		0.957		0.967**
		(0.023)		(0.024)		(0.071)		(0.014)
Number of		1.022***		1.014**		1.049**		1.032***
Dates		(0.006)		(0.005)		(0.024)		(0.013)
Youth Characteristics								
Black	1.055***	1.151***						
	(0.021)	(0.041)						
Hispanic	1.013	1.052*						
	(0.018)	(0.031)						
Age Puberty	0.988**	0.990	0.984***	0.981**	1.013	1.067**	1.001	0.997
	(0.005)	(0.007)	(0.005)	(0.008)	(0.017)	(0.033)	(0.012)	(0.011)
Lives 1 Parent	1.030**	1.011	1.023	1.011	1.081**	1.041	1.000	0.984
	(0.014)	(0.018)	(0.016)	(0.021)	(0.036)	(0.063)	(0.027)	(0.015)
Works	1.041***	1.016	1.037**	1.015	1.007	0.952	1.073	1.014
	(0.016)	(0.018)	(0.015)	(0.017)	(0.055)	(0.071)	(0.047)	(0.026)
PIAT math	0.998***	0.999***	0.998***	0.999*	0.999	0.996**	0.999	0.999
	(0.0003)	(0.0004)	(0.0003)	(0.0005)	(0.001)	(0.002)	(0.001)	(0.001)
Excellent	0.972***	0.976	0.983	0.989	0.935*	0.954	0.911***	0.946***
Health	(0.010)	(0.016)	(0.011)	(0.016)	(0.035)	(0.067)	(0.022)	(0.020)
Good Health	0.996	0.995	0.990	0.987	0.953	0.945	1.021	1.112**
	(0.012)	(0.017)	(0.012)	(0.016)	(0.040)	(0.072)	(0.028)	(0.055)
Parental Characteristics								
Parental	0.996*	0.994*	0.997	0.994*	0.986	0.990	1.000	1.002
Income[a]	(0.002)	(0.003)	(0.002)	(0.003)	(0.010)	(0.017)	(0.007)	(0.003)
Mother High	0.958***	0.954***	0.980	0.985	0.859***	0.857**	0.928***	0.932**
School	(0.012)	(0.017)	(0.016)	(0.023)	(0.032)	(0.054)	(0.023)	(0.026)
Mother More	0.961**	0.956**	0.980	0.990	0.874***	0.824***	0.988	0.971
High School	(0.015)	(0.021)	(0.018)	(0.026)	(0.038)	(0.057)	(0.029)	(0.018)

(Continued)

Table XXIV Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	1.003	0.997	0.994	0.989	1.095**	1.081	0.952*	0.970
Full Time	(0.013)	(0.019)	(0.014)	(0.020)	(0.042)	(0.076)	(0.027)	(0.021)
Mother Works	1.015	1.027	1.002	1.006	1.128*	1.163	1.006	1.011
Part Time	(0.018)	(0.027)	(0.017)	(0.024)	(0.076)	(0.122)	(0.036)	(0.031)
Youth-Parent Relationship								
Autonomy	0.992**	1.006	0.993*	1.004	0.966***	0.984	1.002	1.011
Index	(0.004)	(0.005)	(0.004)	(0.005)	(0.010)	(0.019)	(0.007)	(0.007)
Family Routine	0.998*	0.999	0.997***	0.998	1.003	0.996	1.001	1.006**
Index	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)
Place of Residence								
Suburban	0.997	0.999	0.991	0.991	1.187	1.219	0.976	0.972**
	(0.017)	(0.024)	(0.014)	(0.020)	(0.143)	(0.246)	(0.037)	(0.012)
Rural	0.999	1.000	0.999	1.004	1.025	0.936	0.954**	0.971**
	(0.014)	(0.019)	(0.013)	(0.018)	(0.049)	(0.067)	(0.021)	(0.013)
Northeast	1.014	1.022	1.012	1.052	1.044	0.902	1.025	0.981
	(0.024)	(0.037)	(0.025)	(0.051)	(0.093)	(0.094)	(0.068)	(0.020)
North Central	0.991	0.965**	0.989	0.974	1.012	0.891*	0.981	1.002
	(0.014)	(0.016)	(0.013)	(0.016)	(0.051)	(0.060)	(0.030)	(0.028)
West	0.970**	0.948***	0.969***	0.966**	1.064	0.868*	0.984	0.942*
	(0.012)	(0.015)	(0.011)	(0.015)	(0.090)	(0.068)	(0.038)	(0.031)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.001	0.996	0.998**	0.997**
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)
Abortion[c]	1.000	1.000	1.000	1.001	1.000	0.999	0.999	0.998**
Clinics	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
N	2,382	1,407	1,437	866	502	276	443	254

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Table XXV shows the estimated results for the association of male weight perceptions with early sexual debut. Results show that for males in general, perceiving oneself as overweight was associated with 2.7% lower odds of early sexual debut. When analyses by racial/ethnic subgroups were undertaken a different pattern of results emerged. For white males, Model 1 shows that overweight self-perceptions were associated with 1.9% lower odds of early sexual debut, but this effect lost statistical significance once the choice variables were introduced in Model 2. For black males, underweight self-perceptions were associated with 12.4% lower odds of early sexual debut. For Hispanics, the relationship between weight perceptions and early sexual debut had an inverse U pattern, with males who perceived their weight as underweight having 3.1% lower odds of early sexual debut and Hispanic males who perceived their weight as overweight having 4.6% lower odds of early sexual debut.

Turning to the results for the other covariates, higher scores on the behavior problems index were associated with 1.0% and 1.1% higher odds of early sexual debut for white and Hispanic males, but no such relationship was found for black males. Having a higher number of dates was associated with increased odds of early sexual debut for all three racial/ethnic groups. For whites only, higher scores on the substance use index and on the delinquency index were associated with 2.7% and 1.4% higher odds of early sexual debut, respectively. For Hispanics, reporting no religious affiliation was associated with 3.9% lower odds of early sexual debut.

Looking at the youth characteristics, results show that higher scores on the PIAT math test were associated with lower odds of early sexual debut for white and black males, but not for Hispanics. Reporting excellent health status was associated with 7.0% lower odds of early sexual debut for Hispanics only, and for this subgroup, reporting good health status was associated with 14% higher odds of early sexual debut.

Table XXV: Effect of Male Weight Perceptions on Early Sexual Debut: Probit Results-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	0.984	0.994	0.996	1.007	0.904***	0.876**	0.954***	0.969**
Underweight	(0.012)	(0.018)	(0.012)	(0.018)	(0.030)	(0.057)	(0.017)	(0.013)
Perceived	0.980*	0.973*	0.981*	0.977	1.041	1.065	0.969	0.954**
Overweight	(0.010)	(0.015)	(0.010)	(0.014)	(0.053)	(0.100)	(0.020)	(0.020)
Choice Variables								
Behavior		1.011**		1.010**		1.025		1.011*
Problems Index		(0.004)		(0.004)		(0.018)		(0.007)
Substance		1.037***		1.027***		1.043		1.007
Index		(0.008)		(0.008)		(0.038)		(0.011)
Delinquency		1.017***		1.014***		1.035		1.010
Index		(0.005)		(0.005)		(0.022)		(0.008)
Depressed		0.963**		0.976		0.905		
		(0.016)		(0.017)		(0.072)		
No Religion		1.003		1.009		0.946		0.961**
		(0.023)		(0.024)		(0.070)		(0.019)
Number of		1.022***		1.013**		1.046**		1.036***
Dates		(0.006)		(0.005)		(0.024)		(0.014)
Youth Characteristics								
Black	1.050***	1.150***						
	(0.019)	(0.040)						
Hispanic	1.012	1.057*						
	(0.017)	(0.032)						
Age Puberty	0.988**	0.991	0.984***	0.982**	1.015	1.084***	1.000	0.999
	(0.005)	(0.007)	(0.005)	(0.008)	(0.017)	(0.033)	(0.012)	(0.013)
Lives 1 Parent	1.030**	1.011	1.023	1.012	1.078**	1.036	0.997	0.975
	(0.014)	(0.018)	(0.016)	(0.021)	(0.037)	(0.062)	(0.026)	(0.017)
Works	1.041***	1.016	1.037**	1.016	1.005	0.949	1.070	1.028
	(0.016)	(0.018)	(0.015)	(0.017)	(0.054)	(0.069)	(0.045)	(0.034)
PIAT math	0.998***	0.999***	0.999***	0.999*	0.999	0.997*	0.999	0.999
	(0.0003)	(0.0004)	(0.0003)	(0.0005)	(0.001)	(0.002)	(0.001)	(0.001)
Excellent	0.970***	0.975	0.982*	0.987	0.922**	0.946	0.911***	0.930***
Health	(0.010)	(0.016)	(0.011)	(0.015)	(0.035)	(0.067)	(0.021)	(0.026)
Good Health	0.997	0.997	0.992	0.988	0.952	0.946	1.022	1.140**
	(0.012)	(0.017)	(0.012)	(0.016)	(0.040)	(0.072)	(0.028)	(0.068)
Parental Characteristics								
Parental	0.997*	0.994*	0.997	0.995*	0.984	0.990	0.999	1.003
Income[a]	(0.002)	(0.003)	(0.002)	(0.003)	(0.010)	(0.017)	(0.007)	(0.004)
Mother High	0.958***	0.954***	0.981	0.982	0.854***	0.868**	0.929***	0.911***
School	(0.012)	(0.017)	(0.0153)	(0.022)	(0.032)	(0.056)	(0.022)	(0.032)
Mother More	0.962**	0.954**	0.981	0.986	0.872***	0.830***	0.983	0.954*
High School	(0.015)	(0.021)	(0.018)	(0.025)	(0.038)	(0.057)	(0.028)	(0.023)

(Continued)

Table XXV Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	1.004	0.999	0.996	0.989	1.098**	1.064	0.951*	0.974
Full Time	(0.013)	(0.019)	(0.014)	(0.020)	(0.043)	(0.076)	(0.027)	(0.024)
Mother Works	1.014	1.026	1.001	1.005	1.132*	1.141	1.004	1.007
Part Time	(0.018)	(0.027)	(0.016)	(0.023)	(0.078)	(0.117)	(0.035)	(0.034)
Youth-Parent Relationship								
Autonomy	0.992**	1.006	0.993*	1.004	0.961***	0.976	1.003	1.012*
Index	(0.004)	(0.005)	(0.004)	(0.005)	(0.011)	(0.020)	(0.006)	(0.007)
Family Routine	0.998**	0.999	0.997***	0.998	1.003	0.996	1.001	1.007**
	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)
Place of Residence								
Suburban	0.996	0.998	0.991	0.991	1.168	1.211	0.967	0.959**
	(0.017)	(0.024)	(0.014)	(0.019)	(0.131)	(0.234)	(0.030)	(0.018)
Rural	0.999	0.999	0.999	1.002	1.043	0.962	0.964	0.963**
	(0.013)	(0.019)	(0.012)	(0.017)	(0.053)	(0.076)	(0.027)	(0.018)
Northeast	1.012	1.023	1.013	1.053	1.023	0.898	1.056	1.016
	(0.023)	(0.037)	(0.025)	(0.051)	(0.087)	(0.094)	(0.084)	(0.053)
North Central	0.991	0.965**	0.989	0.975	1.008	0.886*	0.989	1.023
	(0.014)	(0.016)	(0.013)	(0.015)	(0.050)	(0.059)	(0.033)	(0.055)
West	0.970**	0.948***	0.970***	0.965**	1.069	0.895	0.996	0.961
	(0.012)	(0.015)	(0.011)	(0.015)	(0.093)	(0.081)	(0.037)	(0.033)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.001	0.997	0.998*	0.997**
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)
Abortion[c]	1.000	1.000	1.000	1.001	1.000	0.999	1.000	0.999**
Clinics	(0.0003)	(0.001)	(0.0004)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
N	2,382	1,407	1,437	866	502	276	443	254

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

An examination of parental characteristics revealed that income was a protective factor for white males only, while maternal higher education (high school or more) was associated with decreased odds of early sexual debut for black and Hispanic males. For Hispanic males, higher parental control was associated with 1.2% higher odds of early sexual debut, and as found in the analysis of the effect of actual weight on sexual debut, higher family involvement in youth's life was associated with 0.7% higher odds of early sexual debut. In addition, for Hispanic males, living in a state with higher adolescent pregnancy rates and living in a state with fewer abortion providers were both protective factors against early sexual debut.

Table XXVI shows the estimated relationship between male weight misperceptions and early sexual debut. No significant relationship was found between misperceptions of weight and early sexual debut for either the overall sample or for the white male subsample. For Hispanics, Model 1 showed that misperceiving one's weight as skinnier than in reality was associated with 3.4% lower odds of early sexual debut. However, when choice variables were introduced in Model 2, the results for Hispanic males lost their statistical significance. Unexpectedly, black males who misperceived their weight as heavier than in reality had 15.7% lower odds of early sexual debut. The results for the rest of the covariates were very similar with those found in Table XXIV (actual weight and early sexual debut) and Table XXV (perceived weight and early sexual debut).

Table XXVI: Effect of Male Weight Misperceptions on Early Sexual Debut-Odds Ratios (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived Heavier	1.000 (0.021)	0.992 (0.028)	1.002 (0.020)	1.002 (0.028)	0.886** (0.048)	0.843* (0.076)	0.996 (0.036)	0.974 (0.019)
Misperceived Skinnier	0.998 (0.010)	1.000 (0.015)	1.004 (0.011)	1.001 (0.014)	0.975 (0.034)	0.964 (0.058)	0.966* (0.020)	0.972 (0.019)
Choice Variables								
Behavior Problems Index		1.011** (0.004)		1.010** (0.004)		1.023 (0.018)		1.012* (0.007)
Substance Index		1.036*** (0.008)		1.027*** (0.008)		1.055 (0.039)		1.007 (0.012)
Delinquency Index		1.017*** (0.005)		1.014*** (0.005)		1.026 (0.023)		1.009 (0.007)
Depressed		0.963** (0.017)		0.975 (0.017)		0.909 (0.074)		
No Religion		1.003 (0.023)		1.011 (0.024)		0.954 (0.073)		0.957** (0.018)
Number of Dates		1.022*** (0.006)		1.014** (0.006)		1.049** (0.024)		1.038*** (0.014)
Youth Characteristics								
Black	1.052*** (0.020)	1.151*** (0.041)						
Hispanic	1.011 (0.017)	1.054* (0.032)						
Age Puberty	0.988** (0.005)	0.990 (0.007)	0.983*** (0.005)	0.981** (0.008)	1.008 (0.017)	1.066** (0.032)	0.999 (0.012)	0.994 (0.014)
Lives 1 Parent	1.031** (0.014)	1.011 (0.018)	1.024 (0.016)	1.011 (0.021)	1.076** (0.037)	1.035 (0.063)	0.993 (0.026)	0.972 (0.018)
Works	1.041*** (0.016)	1.016 (0.018)	1.037** (0.016)	1.016 (0.017)	1.014 (0.058)	0.968 (0.077)	1.079* (0.048)	1.039 (0.042)
PIAT math	0.998*** (0.000)	0.999*** (0.000)	0.998*** (0.000)	0.999* (0.000)	0.999 (0.001)	0.997* (0.002)	0.999 (0.001)	0.999 (0.001)
Excellent Health	0.972*** (0.010)	0.976 (0.016)	0.983 (0.011)	0.989 (0.016)	0.924** (0.036)	0.946 (0.067)	0.913*** (0.022)	0.938** (0.025)
Good Health	0.996 (0.012)	0.994 (0.017)	0.990 (0.011)	0.985 (0.015)	0.955 (0.041)	0.949 (0.072)	1.015 (0.026)	1.122** (0.060)
Parental Characteristics								
Parental Income[a]	0.997* (0.002)	0.994* (0.003)	0.997 (0.002)	0.994* (0.003)	0.984 (0.010)	0.988 (0.017)	0.999 (0.007)	1.001 (0.004)
Mother High School	0.958*** (0.012)	0.954*** (0.017)	0.980 (0.016)	0.983 (0.023)	0.851*** (0.032)	0.868** (0.057)	0.929*** (0.022)	0.917*** (0.030)
Mother More High School	0.962** (0.015)	0.955** (0.021)	0.980 (0.018)	0.987 (0.026)	0.870*** (0.038)	0.827*** (0.057)	0.983 (0.028)	0.957* (0.022)

(Continued)

Table XXVI Continued

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Mother Works	1.003	0.998	0.994	0.989	1.107***	1.080	0.952*	0.966
Full Time	(0.013)	(0.019)	(0.014)	(0.020)	(0.044)	(0.075)	(0.028)	(0.025)
Mother Works	1.015	1.027	1.002	1.007	1.156**	1.176	1.009	1.013
Part Time	(0.018)	(0.027)	(0.017)	(0.025)	(0.082)	(0.123)	(0.036)	(0.037)
Youth-Parent Relationship								
Autonomy	0.992**	1.006	0.993*	1.004	0.966***	0.982	1.003	1.013*
Index	(0.004)	(0.005)	(0.004)	(0.005)	(0.011)	(0.020)	(0.007)	(0.008)
Family Routine	0.998*	0.999	0.997***	0.998	1.003	0.996	1.001	1.007**
	(0.001)	(0.002)	(0.001)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)
Place of Residence								
Suburban	0.997	0.999	0.992	0.991	1.166	1.275	0.967	0.960**
	(0.017)	(0.024)	(0.014)	(0.020)	(0.127)	(0.244)	(0.032)	(0.016)
Rural	0.999	1.000	0.999	1.003	1.033	0.941	0.964	0.963**
	(0.014)	(0.019)	(0.013)	(0.017)	(0.052)	(0.069)	(0.029)	(0.016)
Northeast	1.013	1.023	1.013	1.051	1.030	0.894	1.051	1.004
	(0.024)	(0.037)	(0.025)	(0.051)	(0.092)	(0.092)	(0.079)	(0.048)
North Central	0.991	0.965**	0.989	0.974	1.007	0.891*	0.981	0.994
	(0.014)	(0.016)	(0.013)	(0.016)	(0.053)	(0.061)	(0.031)	(0.031)
West	0.970**	0.948***	0.969***	0.966**	1.052	0.871*	0.992	0.950
	(0.012)	(0.015)	(0.011)	(0.015)	(0.090)	(0.071)	(0.037)	(0.034)
State-Level Controls For Adolescent Pregnancy								
Birth Rates[b]	1.000	1.000	1.000	1.000	1.000	0.996	0.998*	0.997**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)
Abortion[c]	1.000	1.000	1.000	1.001	1.000	0.999	1.000	0.999**
Clinics	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
N	2,377	1,407	1,435	866	499	276	443	254

Note: All Regressions control for age and year trends. All regressions are weighted using NLSY sample weights. Standard errors are reported in parentheses and are robust and adjusted for clustering at individual level. [a] $1982-84. [b] Number of pregnancies per 1,000 women aged between 15-19 years old. [c] Percentages of counties in the state not having an abortion provider *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$.

Risky Sexual Behaviors

Female Adolescents

Table XXVII shows the estimated results for the association between actual weight and the number of sex partners in the previous year for female adolescents proportional to the times the youth had sex in the previous year. For females in general, the relationship between measures of actual weight and number of sex partners was U shaped, with underweight females having 57.1% higher expected number of sex partners than their normal weight counterparts, and with overweight females having 39.4% higher expected number of sexual partners than their normal weight counterparts. When the analyses were undertaken by racial/ethnic groups a different pattern of results emerged. For white females, being overweight was associated with 54.7% higher expected number of sex partners. For black females, being underweight was associated with more than eight and a half times more sex partners than for their normal weight counterparts. For Hispanics, Model 1 (which did not control for choice variables) showed a similar pattern as the overall sample, with females from both underweight and overweight categories having significantly higher expected number of partners than their normal weight counterparts. Once choice variables were introduced in the analysis, the relationship between underweight status and number of sex partners lost significance. Model 2 showed that for Hispanic females being overweight was associated with more than three and a half times higher expected number of sex partners as compared to the normal weight females.

Looking at the choice variables, results showed that higher scores on the delinquency index were associated with 20.7% higher expected number of sex partners for Hispanic females only. Being depressed was a risk factor only for black females and was associated with 91.8% higher expected number of sex partners. In addition, increased number of dates was associated

with 16.3% and 37.1% lower expected number of sex partners for black and Hispanic females, respectively.

Turning to youth characteristics, results showed that reporting excellent health status was associated with 29.1% and 30.9% lower expected number of sex partners for black and Hispanic females, respectively as compared to their counterparts that reported poor health status. In addition, compared to youth who reported poor health status, white females who reported good health status had 41.3% higher expected number of sex partners, while Hispanic females had 45.3% lower expected number of sexual partners.

An examination of the effects of parental characteristics showed that compared to their counterparts who had a mother who did not completed high school, white females with mothers that completed high school had close to four times higher expected number of sex partners while black females had 41.6% lower expected number of sex partners. Part time employment as compared to mothers not working was associated with 45.1% lower expected number of sex partners for black females. Maternal full time employment was associated with 62% higher expected number of sex partners for white females only. In addition, for white females, living in a state with higher proportion of counties not having an abortion provider was associated with 4.8% lower expected number of sex partners.

Table XXVII: Effect of Actual Weight on Number of Sex Partners for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	1.851**	1.571*	1.289	1.298	11.07***	8.614***	3.085***	1.339
	(0.479)	(0.382)	(0.270)	(0.279)	(6.309)	(4.293)	(1.327)	(0.600)
Overweight	1.429*	1.394*	1.507*	1.547**	0.753	0.724	2.437*	3.691***
	(0.264)	(0.261)	(0.346)	(0.337)	(0.157)	(0.183)	(1.253)	(1.784)
Choice Variables								
Substance		1.006		1.035		0.885		1.134
Use Index		(0.060)		(0.103)		(0.067)		(0.180)
Delinquency		1.114***		1.082		1.072		1.207*
Index		(0.044)		(0.053)		(0.063)		(0.126)
Depressed		1.123		1.045		1.918***		0.967
		(0.161)		(0.220)		(0.415)		(0.338)
Number of		0.856***		0.934		0.837***		0.629***
Dates		(0.037)		(0.056)		(0.050)		(0.092)
Youth Characteristics								
Youth Works	1.134	1.135	0.955	0.959	1.209	1.291	1.662	1.623
	(0.135)	(0.132)	(0.152)	(0.153)	(0.218)	(0.206)	(0.568)	(0.526)
PIAT math	0.997	0.995	1.000	0.996	0.987	0.987	0.992	0.981
	(0.008)	(0.008)	(0.012)	(0.012)	(0.008)	(0.008)	(0.028)	(0.031)
Excellent	0.745***	0.718***	0.801	0.788	0.653**	0.709*	0.738	0.691*
Health	(0.078)	(0.076)	(0.128)	(0.126)	(0.117)	(0.134)	(0.168)	(0.152)
Good Health	1.171	1.138	1.414**	1.413***	0.955	1.060	0.669	0.547*
	(0.118)	(0.119)	(0.193)	(0.189)	(0.144)	(0.160)	(0.181)	(0.178)
Lives One	0.822	0.893	1.300	1.404	0.599*	0.643	0.526	0.790
Parent	(0.141)	(0.155)	(0.316)	(0.325)	(0.185)	(0.198)	(0.253)	(0.451)
Parental Characteristics								
Mother High	2.236***	1.936**	3.216**	3.894**	0.756**	0.584*	8.249***	1.616
School	(0.664)	(0.573)	(1.544)	(2.138)	(0.096)	(0.172)	(6.056)	(1.176)
Mother More	1.492	1.231	2.008	2.026	0.985	0.742	1.984	0.619
High School	(0.430)	(0.366)	(0.857)	(0.941)	(0.310)	(0.316)	(1.522)	(0.591)
Mother Part	0.826	0.845	1.245	1.339	0.676*	0.549***	0.344*	0.515
Time	(0.144)	(0.150)	(0.295)	(0.319)	(0.145)	(0.113)	(0.199)	(0.269)
Mother Full	1.149	1.144	1.382	1.620**	1.192	1.024	0.970	0.791
Time	(0.170)	(0.172)	(0.315)	(0.371)	(0.226)	(0.194)	(0.465)	(0.393)
Parental Income	1.009	1.015	1.003	0.995	1.017	1.005	1.016	1.046
($1982-84)	(0.021)	(0.021)	(0.027)	(0.029)	(0.040)	(0.043)	(0.047)	(0.050)
State Level Controls								
Abortion[a]	0.967*	0.977	0.955*	0.952*	0.937**	0.957	1.019	1.008
Clinics	(0.018)	(0.019)	(0.026)	(0.027)	(0.024)	(0.026)	(0.072)	(0.072)
Birth Rates[b]	0.990	0.991	0.992	0.984	1.006	1.016	0.978	1.026
	(0.016)	(0.016)	(0.023)	(0.023)	(0.025)	(0.026)	(0.050)	(0.051)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider.[b] Number of pregnancies per 1,000 women aged between 15-19 years old.

Table XXVIII shows the estimated relationships between weight perceptions and number of sex partners in the previous year for female adolescents. No significant relationship between perceptions of weight and number of sex partners was found for the overall female sample and for the black females subsample. For white females, perceiving one's weight as overweight was associated with 35.6% higher expected number of sex partners. For Hispanics, perceiving one's weight as overweight was associated with 2.4 times higher expected number of sex partners as compared to their counterparts who perceived their weight as normal.

The results for the choice variables show that, unexpectedly, higher scores on the substance use index were associated with 15% lower expected number of sex partners for black females, but not for whites or Hispanics. Higher scores on the delinquency index were associated with 8.9% and 19.2% higher expected number of sex partners for white and Hispanic females, respectively. For blacks, being depressed was associated with twice as many expected number of sex partners as compared to their counterparts who reported not being depressed. In addition, increased numbers of dates was associated with 18.9% and 33.2% lower expected number of sex partners for black and Hispanic females, respectively.

Turning to an examination of youth characteristics, results showed that Hispanic females who reported working had 78% higher expected number of sex partners than their counterparts who did not work. For black females, having higher scores on the PIAT math tests was associated with 27.6% lower expected number of sex partners. As in Table XXVII, good health status was a risk factor for whites and a protective factor for Hispanic females. Parental characteristics and state-level controls for liberal versus conservative views on adolescent sexual activity show the same pattern of results as that presented in Table XXVII.

Table XXVIII: Effect of Weight Perceptions on Number of Sex Partners for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	0.909	0.788	1.019	0.927	0.599	0.493	1.396	1.760
Underweight	(0.192)	(0.184)	(0.250)	(0.246)	(0.248)	(0.218)	(0.562)	(0.710)
Perceived	1.142	1.116	1.327*	1.356*	0.782	0.807	2.287***	2.368**
Overweight	(0.140)	(0.144)	(0.217)	(0.220)	(0.126)	(0.147)	(0.690)	(0.814)
Choice Variables								
Substance		1.012		1.042		0.850**		1.071
Use Index		(0.062)		(0.104)		(0.070)		(0.160)
Delinquency		1.116***		1.089*		1.107		1.192*
Index		(0.043)		(0.050)		(0.074)		(0.112)
Depressed		1.119		0.977		2.101***		0.826
		(0.169)		(0.212)		(0.489)		(0.278)
Number of		0.855***		0.924		0.821***		0.668***
Dates		(0.037)		(0.055)		(0.048)		(0.084)
Youth Characteristics								
Youth Works	1.117	1.125	0.907	0.912	1.187	1.268	1.708	1.780*
	(0.134)	(0.130)	(0.144)	(0.144)	(0.217)	(0.198)	(0.557)	(0.587)
PIAT math	0.997	0.995	1.000	0.996	0.987*	0.988	1.009	1.005
	(0.008)	(0.008)	(0.011)	(0.011)	(0.008)	(0.007)	(0.039)	(0.042)
Excellent	0.746***	0.718***	0.790	0.776	0.674**	0.724*	0.785	0.700
Health	(0.079)	(0.077)	(0.129)	(0.128)	(0.128)	(0.140)	(0.185)	(0.157)
Good Health	1.193*	1.166	1.433***	1.432***	0.967	1.086	0.705	0.559**
	(0.122)	(0.123)	(0.195)	(0.191)	(0.151)	(0.172)	(0.190)	(0.165)
Lives One	0.839	0.906	1.369	1.463	0.652	0.708	0.446*	0.622
Parent	(0.148)	(0.162)	(0.335)	(0.344)	(0.208)	(0.217)	(0.212)	(0.362)
Parental Characteristics								
Mother High	2.161***	1.934**	3.198**	3.921***	0.814	0.632	7.659***	1.731
School	(0.632)	(0.558)	(1.483)	(2.043)	(0.122)	(0.198)	(5.240)	(1.286)
Mother More	1.457	1.229	1.935	1.898	1.045	0.764	1.928	0.712
High School	(0.419)	(0.362)	(0.824)	(0.848)	(0.343)	(0.341)	(1.305)	(0.686)
Mother Part	0.833	0.844	1.318	1.437	0.623**	0.518***	0.343*	0.498
Time	(0.145)	(0.151)	(0.311)	(0.342)	(0.137)	(0.112)	(0.200)	(0.258)
Mother Full	1.118	1.117	1.397	1.654**	1.177	0.991	0.966	0.875
Time	(0.165)	(0.169)	(0.318)	(0.383)	(0.229)	(0.195)	(0.463)	(0.429)
Parental Income	1.011	1.017	1.007	0.998	1.018	1.001	1.006	1.030
($1982-84)	(0.021)	(0.021)	(0.027)	(0.028)	(0.041)	(0.044)	(0.043)	(0.047)
State Level Controls								
Abortion[a]	0.965*	0.975	0.946**	0.943**	0.958	0.976	1.059	1.040
Clinics	(0.019)	(0.020)	(0.025)	(0.026)	(0.028)	(0.027)	(0.085)	(0.085)
Birth Rates[b]	0.989	0.989	0.988	0.981	1.004	1.015	0.990	1.019
	(0.017)	(0.017)	(0.023)	(0.022)	(0.026)	(0.027)	(0.055)	(0.054)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old.

Table XXIX shows the results for the association between weight misperceptions and number of sex partners for females. No significant associations were found for the overall sample and the Hispanic subsample. For white females, adolescents who misperceived their weight as heavier had 29.5% higher expected number of sex partners as compared to their counterparts who correctly perceived their weight. For black females, unexpectedly, youths who misperceived their weight as skinnier had 38.2% lower expected number of sex partners than their counterparts who correctly perceived their weight. The remaining covariates followed a very similar pattern with that presented in Table XXVII (actual weight and number of sex partners) and XXVIII (perceived weight and number of sex partners).

Table XXIX: Effect of Weight Misperceptions on Number of Sex Partners for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived Heavier	1.197	1.126	1.298*	1.295*	1.064	1.013	1.827	1.244
	(0.148)	(0.138)	(0.197)	(0.197)	(0.215)	(0.209)	(0.675)	(0.404)
Misperceived Skinnier	0.929	0.869	0.996	0.932	0.675**	0.618***	1.079	0.968
	(0.115)	(0.113)	(0.223)	(0.220)	(0.107)	(0.091)	(0.352)	(0.359)
Choice Variables								
Substance Use Index		1.013		1.043		0.865*		1.128
		(0.062)		(0.106)		(0.068)		(0.176)
Delinquency Index		1.113***		1.085*		1.085		1.184
		(0.042)		(0.050)		(0.068)		(0.121)
Depressed		1.110		0.978		2.102***		0.950
		(0.165)		(0.214)		(0.496)		(0.343)
Number of Dates		0.858***		0.916		0.822***		0.695***
		(0.037)		(0.055)		(0.050)		(0.097)
Youth Characteristics								
Youth Works	1.124	1.138	0.916	0.917	1.287	1.399**	1.786*	1.688
	(0.136)	(0.134)	(0.145)	(0.145)	(0.251)	(0.226)	(0.597)	(0.546)
PIAT math	0.998	0.995	1.000	0.997	0.987	0.988	0.999	0.987
	(0.008)	(0.007)	(0.011)	(0.011)	(0.008)	(0.007)	(0.036)	(0.036)
Excellent Health	0.742***	0.718***	0.775	0.766	0.672**	0.718*	0.752	0.702
	(0.078)	(0.077)	(0.126)	(0.125)	(0.124)	(0.136)	(0.172)	(0.155)
Good Health	1.198*	1.164	1.439***	1.434***	0.951	1.073	0.728	0.594*
	(0.124)	(0.123)	(0.199)	(0.193)	(0.147)	(0.163)	(0.189)	(0.184)
Lives One Parent	0.849	0.913	1.328	1.431	0.626	0.686	0.457*	0.700
	(0.151)	(0.164)	(0.324)	(0.335)	(0.213)	(0.219)	(0.217)	(0.393)
Parental Characteristics								
Mother High School	2.152***	1.911**	3.071**	3.762**	0.816	0.874	10.78***	2.654
	(0.623)	(0.537)	(1.411)	(1.947)	(0.123)	(0.248)	(7.283)	(2.096)
Mother More High School	1.434	1.197	1.932	1.894	0.988	1.006	2.704	0.912
	(0.411)	(0.342)	(0.814)	(0.835)	(0.329)	(0.415)	(1.790)	(0.921)
Mother Part Time	0.830	0.837	1.325	1.418	0.667*	0.539***	0.360*	0.489
	(0.146)	(0.150)	(0.323)	(0.347)	(0.147)	(0.113)	(0.208)	(0.253)
Mother Full Time	1.105	1.099	1.377	1.598**	1.211	1.027	1.005	0.859
	(0.162)	(0.163)	(0.317)	(0.370)	(0.227)	(0.194)	(0.473)	(0.421)
Parental Income ($1982-84)	1.014	1.019	1.009	1.002	1.022	1.009	1.023	1.060
	(0.021)	(0.022)	(0.027)	(0.028)	(0.042)	(0.045)	(0.049)	(0.054)
State Level Controls								
Abortion[a] Clinics	0.964*	0.974	0.944**	0.942**	0.968	0.989	1.062	1.029
	(0.020)	(0.020)	(0.026)	(0.027)	(0.028)	(0.029)	(0.077)	(0.084)
Birth Rates[b]	0.989	0.989	0.988	0.981	1.010	1.022	0.975	0.980
	(0.017)	(0.018)	(0.023)	(0.023)	(0.025)	(0.027)	(0.053)	(0.052)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider.[b] Number of pregnancies per 1,000 women aged between 15-19 years old.

Turning to the results regarding times contraceptive use, Table XXX shows the estimates for the relationship between actual weight and contraceptives used for female adolescents. No significant relationship between actual weight and times contraceptives were used was found in the overall sample, the white subsample, and the black subsample. For Hispanic females, being overweight was associated with a 32% lower amount of contraceptive use proportional to the times the adolescents had sex.

Results for the choice variables show that, for Hispanic females, higher scores on the substance use index and delinquency index as well as self-reported depressed status were risk factors for contraceptive use. For black females, increased number of dates was associated with a 5% lower expected amount of contraceptive use.

Results for the youth characteristics showed that for white females, reporting excellent health status was associated with a 14.4% lower expected amount of contraceptive use, while living in a single parent household was associated with a 31.4% higher expected amount of contraceptive use. For black females, higher PIAT math scores were associated with a 1.3% higher expected amount of contraceptive use while reporting good health status was associated with a 20.7% lower expected amount of contraceptive use. For Hispanics, working and reporting good health were both associated with increased expected contraceptive use.

Turning to the results for parental characteristics, parental income was associated with a 1.8% lower expected amount of contraceptive use for white females, but not for black or Hispanic females. Unexpectedly, higher levels of maternal education were associated with lower expected contraceptive use for black females. For Hispanics, having a mother who works part-time was associated with 32% higher expected contraceptive use. No significant association was found between state-level controls and female contraceptive use.

Table XXX: Effect of Actual Weight on Times Contraceptives Used for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	0.939	0.961	0.924	0.960	1.013	1.025	1.392	1.216
	(0.044)	(0.047)	(0.061)	(0.063)	(0.129)	(0.132)	(0.372)	(0.333)
Overweight	0.940	0.924	0.897	0.869	1.045	1.018	0.777**	0.680**
	(0.094)	(0.093)	(0.117)	(0.113)	(0.203)	(0.182)	(0.095)	(0.113)
Choice Variables								
Substance		0.933***		0.957		0.915		0.832*
Use Index		(0.024)		(0.029)		(0.058)		(0.078)
Delinquency		1.016		1.028		1.063		0.932*
Index		(0.020)		(0.025)		(0.049)		(0.039)
Depressed		0.856		0.812		1.583		0.621***
		(0.088)		(0.120)		(0.450)		(0.100)
Number of		0.984		0.989		0.950*		0.995
Dates		(0.025)		(0.037)		(0.026)		(0.056)
Youth Characteristics								
Youth Works	1.092	1.106	1.069	1.085	0.969	0.966	1.417**	1.296*
	(0.071)	(0.073)	(0.089)	(0.094)	(0.099)	(0.099)	(0.193)	(0.187)
PIAT math	1.005	1.003	1.004	1.002	1.010**	1.013***	0.987	0.986
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.010)	(0.010)
Excellent	0.932	0.922	0.874**	0.856**	0.950	1.035	0.936	0.932
Health	(0.049)	(0.048)	(0.059)	(0.052)	(0.142)	(0.160)	(0.108)	(0.115)
Good Health	0.952	0.946	0.965	0.949	0.780**	0.793**	1.087	1.275*
	(0.040)	(0.040)	(0.052)	(0.047)	(0.089)	(0.086)	(0.108)	(0.161)
Lives One	1.131	1.241**	1.198*	1.314***	0.752	0.923	1.332	1.087
Parent	(0.095)	(0.105)	(0.119)	(0.133)	(0.154)	(0.118)	(0.311)	(0.264)
Parental Characteristics								
Mother High	0.943	1.156	0.779	1.048	0.945	0.657**	0.568	0.607
School	(0.170)	(0.160)	(0.157)	(0.155)	(0.140)	(0.109)	(0.246)	(0.286)
Mother More	0.804	0.962	1.033	1.386	0.545	0.390**	1.092	0.934
High School	(0.142)	(0.196)	(0.216)	(0.277)	(0.217)	(0.158)	(0.152)	(0.543)
Mother Part	0.973	0.951	0.912	0.930	1.215	1.021	1.064	1.320*
Time	(0.064)	(0.059)	(0.082)	(0.080)	(0.160)	(0.123)	(0.148)	(0.216)
Mother Full	1.051	1.003	1.010	0.996	1.044	0.969	1.073	1.197
Time	(0.064)	(0.061)	(0.083)	(0.090)	(0.087)	(0.088)	(0.184)	(0.240)
Parental Income	0.987	0.986	0.985	0.982*	0.991	0.994	1.024	1.022
($1982-84)	(0.009)	(0.009)	(0.010)	(0.010)	(0.028)	(0.028)	(0.019)	(0.022)
State-Level Controls								
Abortion[a]	1.001	1.006	1.012	1.016	0.990	0.995	0.935	0.937
Clinics	(0.014)	(0.013)	(0.017)	(0.016)	(0.016)	(0.014)	(0.054)	(0.054)
Birth Rates[b]	0.996	1.000	1.006	1.012	0.974	0.978	0.976	0.970
	(0.009)	(0.009)	(0.013)	(0.013)	(0.018)	(0.018)	(0.022)	(0.021)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at p < 0.10; **significant at p < 0.05; ***significant at p < 0.01. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old.

Table XXXI shows the estimated association between perceptions of weight and contraceptive use proportional to the times the youth had sex for female adolescents. No significant associations were found for the overall female sample and the Hispanic female sample. For white females, Model 1 showed no significant relationship, but once the choice variables are introduced in Model 2, results showed that white females who perceived themselves as underweight had a 12.7% higher expected amount of contraceptive use as compared to their counterparts who perceived their weight as normal. For blacks, perceiving one's weight as underweight was associated with a 30.1% higher expected amount of contraceptive use in Model 1. However, once the choice variables were introduced in Model 2, this relationship became non-significant. The remaining control variables followed the same patterns of associations as described in Table XXX.

Table XXXII shows the estimated associations between misperceptions of weight and contraceptives use proportional to the times the youth had sex. No significant associations were found for any of the racial/ethnic groups with the exception of Model 1 for Hispanic females. For Hispanic females, when no choice variables were controlled for, misperceiving one's weight as heavier was associated with 16.2% higher expected contraceptives use, but this relationship became statistically insignificant in Model 2. The remaining covariates followed the same pattern as presented in Table XXX.

Table XXXI: Effect of Perceived Weight on Times Contraceptives Used for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	0.994	1.062	0.996	1.127*	1.301**	1.038	0.767	0.793
Underweight	(0.070)	(0.061)	(0.092)	(0.081)	(0.174)	(0.152)	(0.149)	(0.188)
Perceived	1.085	1.103	1.051	1.064	1.178	1.186	1.052	0.975
Overweight	(0.071)	(0.068)	(0.088)	(0.081)	(0.123)	(0.125)	(0.129)	(0.113)
Choice Variables								
Substance		0.935***		0.958		0.914		0.843*
Use Index		(0.024)		(0.028)		(0.058)		(0.082)
Delinquency		1.015		1.027		1.065		0.949
Index		(0.020)		(0.025)		(0.050)		(0.039)
Depressed		0.848		0.795		1.568		0.620***
		(0.088)		(0.114)		(0.461)		(0.103)
Number of		0.987		0.995		0.951*		1.021
Dates		(0.025)		(0.039)		(0.026)		(0.057)
Youth Characteristics								
Youth Works	1.095	1.111	1.075	1.098	0.968	0.965	1.409**	1.307*
	(0.071)	(0.074)	(0.089)	(0.096)	(0.100)	(0.096)	(0.190)	(0.183)
PIAT math	1.005*	1.004	1.004	1.003	1.009**	1.012**	0.993	0.993
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.009)	(0.010)
Excellent	0.939	0.930	0.888*	0.874**	0.950	1.040	0.961	0.955
Health	(0.049)	(0.049)	(0.060)	(0.055)	(0.140)	(0.159)	(0.108)	(0.114)
Good Health	0.950	0.941	0.960	0.937	0.775**	0.800**	1.013	1.142
	(0.038)	(0.039)	(0.048)	(0.045)	(0.088)	(0.089)	(0.097)	(0.137)
Lives One	1.132	1.239**	1.193*	1.298***	0.681*	0.878	1.330	1.084
Parent	(0.097)	(0.106)	(0.114)	(0.128)	(0.142)	(0.115)	(0.315)	(0.274)
Parental Characteristics								
Mother High	0.952	1.142	0.794	1.033	0.931	0.681**	0.648	0.562
School	(0.169)	(0.157)	(0.159)	(0.157)	(0.121)	(0.117)	(0.250)	(0.254)
Mother More	0.808	0.943	1.030	1.299	0.539	0.404**	1.137	0.821
High School	(0.143)	(0.192)	(0.217)	(0.263)	(0.213)	(0.163)	(0.181)	(0.459)
Mother Part	0.978	0.961	0.917	0.940	1.248*	1.033	1.015	1.264
Time	(0.066)	(0.061)	(0.086)	(0.084)	(0.161)	(0.125)	(0.143)	(0.213)
Mother Full	1.063	1.023	1.030	1.038	1.074	0.985	1.096	1.191
Time	(0.067)	(0.065)	(0.090)	(0.102)	(0.086)	(0.087)	(0.190)	(0.236)
Parental Income	0.987	0.987	0.985	0.984	0.990	0.995	1.029	1.026
($1982-84)	(0.009)	(0.009)	(0.010)	(0.011)	(0.028)	(0.028)	(0.022)	(0.024)
State-Level Controls								
Abortion[a]	1.001	1.007	1.012	1.018	0.983	0.994	0.942	0.937
Clinics	(0.014)	(0.013)	(0.017)	(0.016)	(0.015)	(0.015)	(0.056)	(0.056)
Birth Rates[b]	0.996	0.999	1.006	1.011	0.970	0.976	0.988	0.983
	(0.009)	(0.009)	(0.013)	(0.013)	(0.018)	(0.018)	(0.022)	(0.022)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Table XXXII: Effect of Misperceived Weight on Times Contraceptives Used for Females: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived	1.033	1.044	0.994	1.018	1.199	1.207	1.162*	1.054
Heavier	(0.071)	(0.071)	(0.083)	(0.085)	(0.143)	(0.143)	(0.097)	(0.101)
Misperceived	0.970	0.988	0.943	0.980	1.072	0.993	1.065	1.039
Skinnier	(0.048)	(0.043)	(0.057)	(0.049)	(0.103)	(0.087)	(0.101)	(0.135)
Choice Variables								
Substance		0.933***		0.960		0.906		0.826**
Use Index		(0.024)		(0.029)		(0.057)		(0.080)
Delinquency		1.015		1.024		1.060		0.952
Index		(0.020)		(0.025)		(0.047)		(0.039)
Depressed		0.853		0.808		1.606*		0.652***
		(0.088)		(0.118)		(0.460)		(0.106)
Number of		0.986		0.993		0.953*		1.033
Dates		(0.025)		(0.038)		(0.027)		(0.069)
Youth Characteristics								
Youth Works	1.095	1.109	1.076	1.094	0.966	0.975	1.376**	1.297*
	(0.070)	(0.073)	(0.087)	(0.094)	(0.101)	(0.102)	(0.192)	(0.186)
PIAT math	1.005*	1.004	1.004	1.003	1.010**	1.013***	0.994	0.993
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.009)	(0.010)
Excellent	0.936	0.925	0.889*	0.870**	0.964	1.054	0.924	0.927
Health	(0.047)	(0.048)	(0.056)	(0.051)	(0.145)	(0.162)	(0.104)	(0.117)
Good Health	0.949	0.942	0.956	0.942	0.793**	0.811*	1.034	1.162
	(0.038)	(0.039)	(0.048)	(0.045)	(0.091)	(0.088)	(0.097)	(0.131)
Lives One	1.132	1.240**	1.186*	1.296***	0.730	0.907	1.335	1.069
Parent	(0.094)	(0.104)	(0.110)	(0.124)	(0.153)	(0.117)	(0.318)	(0.267)
Parental Characteristics								
Mother High	0.950	1.157	0.782	1.043	0.932	0.676**	0.538	0.585
School	(0.171)	(0.161)	(0.160)	(0.155)	(0.152)	(0.116)	(0.234)	(0.268)
Mother More	0.809	0.956	1.044	1.364	0.527	0.388**	1.063	0.918
High School	(0.143)	(0.195)	(0.217)	(0.274)	(0.211)	(0.156)	(0.149)	(0.526)
Mother Part	0.973	0.952	0.911	0.930	1.204	1.014	1.054	1.305
Time	(0.064)	(0.059)	(0.084)	(0.082)	(0.155)	(0.121)	(0.149)	(0.218)
Mother Full	1.056	1.011	1.021	1.014	1.042	0.963	1.092	1.211
Time	(0.066)	(0.064)	(0.089)	(0.099)	(0.085)	(0.087)	(0.186)	(0.243)
Parental Income	0.987	0.987	0.985	0.982*	0.994	0.998	1.019	1.021
($1982-84)	(0.009)	(0.009)	(0.010)	(0.010)	(0.028)	(0.028)	(0.019)	(0.022)
State-Level Controls								
Abortion	1.001	1.006	1.013	1.016	0.985	0.993	0.950	0.942
Clinics	(0.014)	(0.013)	(0.016)	(0.016)	(0.016)	(0.014)	(0.053)	(0.054)
Birth Rates	0.997	1.001	1.008	1.013	0.973	0.978	0.983	0.978
	(0.009)	(0.009)	(0.013)	(0.013)	(0.018)	(0.018)	(0.021)	(0.021)
N	2,266	2,179	1,229	1,197	640	604	397	378

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Male Adolescents

Turning to the regression results for male adolescents, Table XXXII shows the estimated relationship between actual weight status and the number of sexual partners in the last year proportional to the times the youth had sex. For the overall sample, being overweight was associated with a 23.2% lower expected number of sex partners as compared to the expected number of sex partners for normal weight males. As compared to their normal weight counterparts, being overweight was associated with 52.3% lower expected number of sex partners for white males. For black males, being underweight was associated with 50.7% higher expected number of sex partners, which was unexpected. No significant relationship between actual weight status and number of sex partners was found for Hispanic males.

Looking at the results for the choice variables, for white males having higher scores on the delinquency index was associated with a 8.0% higher expected number of sex partners. No significant relationship between the choice variables and number of sex partners was found for black males. For Hispanic males, higher scores on the substance use index were associated with 14.5% higher expected number of sexual partners. For Hispanic males, being depressed and going on a large number of dates was associated with decreased number of sex partners.

An examination of youth characteristics revealed that having higher scores on the PIAT math test was associated with a 2.9% and a 5.4% higher expected number of sex partners for black and Hispanic males, respectively. Reporting excellent health status was associated with 26.3% higher expected sex partners for black males, but with a 29% lower expected number of sex partners for Hispanic males. For white males, reporting good health status was associated with a 44.8% higher expected number of sex partners.

Table XXXIII: Effect of Actual Weight on Number of Sex Partners for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	1.058	1.002	1.081	0.842	1.284	1.507**	1.183	1.181
	(0.183)	(0.174)	(0.336)	(0.259)	(0.283)	(0.312)	(0.469)	(0.518)
Overweight	0.764**	0.768*	0.498***	0.477***	1.322	1.308	0.695	0.806
	(0.099)	(0.105)	(0.099)	(0.091)	(0.226)	(0.236)	(0.224)	(0.236)
Choice Variables								
Substance		0.978		0.841		1.034		1.145*
Use Index		(0.052)		(0.093)		(0.064)		(0.085)
Delinquency		1.028		1.080**		1.018		0.997
Index		(0.022)		(0.036)		(0.032)		(0.041)
Depressed		0.929		0.970		1.167		0.582**
		(0.147)		(0.291)		(0.257)		(0.143)
Number of		0.998**		1.001		0.997		0.997***
Dates		(0.001)		(0.002)		(0.003)		(0.001)
Youth Characteristics								
Youth Works	0.949	0.992	1.129	1.193	0.917	0.956	0.848	0.957
	(0.083)	(0.087)	(0.165)	(0.185)	(0.091)	(0.097)	(0.170)	(0.174)
PIAT math	1.015*	1.016*	0.997	0.996	1.030***	1.029***	1.017	1.054**
	(0.008)	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)	(0.028)	(0.022)
Excellent	1.033	1.065	1.039	1.026	1.207	1.263*	0.664**	0.710*
Health	(0.092)	(0.098)	(0.146)	(0.146)	(0.156)	(0.167)	(0.118)	(0.124)
Good Health	1.118	1.078	1.471**	1.448**	0.951	0.953	0.967	0.889
	(0.103)	(0.100)	(0.228)	(0.226)	(0.124)	(0.127)	(0.155)	(0.129)
Lives One	0.874	0.878	0.699	0.725	1.029	1.022	0.850	0.860
Parent	(0.124)	(0.130)	(0.170)	(0.185)	(0.245)	(0.242)	(0.240)	(0.234)
Parental Characteristics								
Mother High	1.662	1.535	2.783	2.717	1.002	0.886	1.196	0.221
School	(0.733)	(0.703)	(2.364)	(2.227)	(0.406)	(0.356)	(0.511)	(0.474)
Mother More	1.522	1.499	2.569	2.350	0.907	0.916	0.209	0.016***
High School	(0.609)	(0.616)	(1.722)	(1.601)	(0.408)	(0.401)	(0.250)	(0.024)
Mother Part	1.026	1.020	1.143	0.958	1.141	1.236	0.759	0.754
Time	(0.146)	(0.149)	(0.240)	(0.199)	(0.212)	(0.239)	(0.249)	(0.244)
Mother Full	0.864	0.885	1.426*	1.292	0.701**	0.723**	0.619*	0.594*
Time	(0.104)	(0.110)	(0.291)	(0.255)	(0.115)	(0.118)	(0.178)	(0.178)
Parental Income	0.987	0.994	0.989	0.999	0.948	0.960	1.055	1.042
($1982-84)	(0.019)	(0.019)	(0.025)	(0.025)	(0.035)	(0.035)	(0.040)	(0.035)
State-Level Controls								
Abortion[a]	0.981	0.978*	0.960**	0.961**	0.984	0.982	0.978	0.978
Clinics	(0.012)	(0.011)	(0.016)	(0.015)	(0.014)	(0.013)	(0.028)	(0.026)
Birth Rates[b]	1.021*	1.021*	1.044**	1.047**	1.007	1.004	0.992	1.004
	(0.012)	(0.012)	(0.018)	(0.019)	(0.016)	(0.015)	(0.032)	(0.033)
N	2,662	2,574	1,222	1,197	885	854	555	523

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

The results for the parental characteristics showed that having a mother who completed more than high school was associated with a 98.4% lower expected number of sex partners for Hispanic males. In addition, having a mother working full time had a protective effect for black and Hispanic males. For white males, living in a state with a higher proportion of counties not having an abortion provider was associated with 1.4% lower expected number of sex partners, and living in a state with higher adolescent birth rates was associated with having 2.1% more sex partners.

Table XXXIV shows the estimated relationships between weight perceptions and number of sex partners in the last year proportional to the times the youth had sex for male adolescents. Results show that for the overall sample, perceiving one's weight as overweight was associated with a 27.3% lower expected number of sex partners. No significant relationship between weight perceptions and number of sex partners was found for white males. For black males, perceiving one's weight as overweight was associated with 43.9% lower expected number of sex partners. For Hispanic males, Model 1 showed that perceiving one's weight as overweight was associated with a 39.4% lower expected number of sex partners. However, when the choice variables were introduced in Model 2, this relationship lost statistical significance. The estimates for the rest of the covariates were comparable in magnitude and followed the same pattern as those presented in Table XXXIII.

Table XXXIV: Effect of Perceived Weight on Number of Sex Partners for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	1.070	1.133	1.039	1.270	0.969	0.925	1.110	1.108
Underweight	(0.133)	(0.141)	(0.234)	(0.286)	(0.186)	(0.172)	(0.233)	(0.241)
Perceived	0.677**	0.727*	0.806	0.827	0.577***	0.561***	0.606**	0.849
Overweight	(0.118)	(0.140)	(0.328)	(0.353)	(0.101)	(0.099)	(0.155)	(0.241)
Choice Variables								
Substance		0.974		0.831		1.037		1.161**
Use Index		(0.053)		(0.094)		(0.066)		(0.088)
Delinquency		1.027		1.073**		1.011		0.995
Index		(0.022)		(0.038)		(0.032)		(0.039)
Depressed		0.866		0.837		1.050		0.604**
		(0.135)		(0.234)		(0.232)		(0.146)
Number of		0.998*		1.001		0.997		0.997***
Dates		(0.001)		(0.002)		(0.003)		(0.001)
Youth Characteristics								
Youth Works	0.948	0.989	1.194	1.223	0.881	0.917	0.841	0.933
	(0.081)	(0.086)	(0.184)	(0.196)	(0.090)	(0.096)	(0.165)	(0.175)
PIAT math	1.014*	1.016*	0.999	0.998	1.033***	1.034***	1.009	1.051**
	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)	(0.011)	(0.028)	(0.023)
Excellent	1.022	1.046	1.147	1.125	1.148	1.186	0.663**	0.703**
Health	(0.090)	(0.096)	(0.160)	(0.164)	(0.156)	(0.164)	(0.112)	(0.123)
Good Health	1.070	1.045	1.416**	1.393**	0.948	0.951	0.887	0.851
	(0.099)	(0.098)	(0.225)	(0.221)	(0.121)	(0.125)	(0.138)	(0.123)
Lives One	0.876	0.876	0.731	0.753	1.051	1.060	0.860	0.854
Parent	(0.122)	(0.127)	(0.177)	(0.190)	(0.235)	(0.239)	(0.244)	(0.230)
Parental Characteristics								
Mother High	1.676	1.592	3.087	3.201	1.218	1.081	1.491	0.371
School	(0.726)	(0.715)	(2.740)	(2.828)	(0.562)	(0.502)	(0.636)	(0.848)
Mother More	1.461	1.454	2.749	2.335	1.024	0.991	0.268	0.026**
High School	(0.564)	(0.579)	(2.099)	(1.865)	(0.488)	(0.464)	(0.318)	(0.044)
Mother Part	1.020	0.998	1.197	1.023	1.137	1.208	0.723	0.724
Time	(0.140)	(0.141)	(0.240)	(0.199)	(0.211)	(0.229)	(0.233)	(0.239)
Mother Full	0.850	0.867	1.412*	1.360	0.672**	0.687**	0.608*	0.582*
Time	(0.098)	(0.104)	(0.265)	(0.255)	(0.105)	(0.106)	(0.176)	(0.174)
Parental Income	0.985	0.991	0.988	0.998	0.964	0.978	1.058	1.045
($1982-84)	(0.019)	(0.019)	(0.025)	(0.027)	(0.034)	(0.034)	(0.037)	(0.036)
State-Level Controls								
Abortion[a]	0.980*	0.977**	0.958**	0.959**	0.975*	0.971**	0.992	0.983
Clinics	(0.012)	(0.011)	(0.017)	(0.017)	(0.013)	(0.013)	(0.028)	(0.027)
Birth Rates[b]	1.022*	1.021*	1.040**	1.043**	1.002	0.999	1.004	1.007
	(0.012)	(0.013)	(0.018)	(0.019)	(0.015)	(0.014)	(0.030)	(0.032)
N	2,662	2,574	1,222	1,197	885	854	555	523

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Table XXXV shows the results for the estimated associations between weight misperceptions and number of sex partners for adolescent males. Results show no significant relationship between weight misperceptions and number of sex partners for the overall sample, as well as for the white and Hispanic subsamples. For black males, misperceiving one's weight as heavier was associated with a 39.9% lower expected number of sex partners. The estimated results for the rest of the covariates were similar in magnitude and significance as those shown in Table XXXIII.

Table XXXV: Effect of Misperceived Weight on Number of Sex Partners for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived Heavier	1.074	1.102	1.839	1.716	0.605**	0.601**	0.656	0.824
	(0.291)	(0.291)	(1.009)	(0.897)	(0.128)	(0.132)	(0.211)	(0.271)
Misperceived Skinnier	1.052	1.019	1.055	1.147	1.076	1.041	0.909	0.777
	(0.103)	(0.105)	(0.188)	(0.218)	(0.153)	(0.147)	(0.179)	(0.155)
Choice Variables								
Substance Use Index		0.977		0.861		1.032		1.146*
		(0.049)		(0.081)		(0.064)		(0.084)
Delinquency Index		1.026		1.069*		1.022		0.993
		(0.022)		(0.037)		(0.033)		(0.039)
Depressed		0.894		0.882		1.164		0.630*
		(0.142)		(0.271)		(0.256)		(0.153)
Number of Dates		0.998**		1.000		0.997		0.997***
		(0.001)		(0.002)		(0.003)		(0.001)
Youth Characteristics								
Youth Works	0.949	1.002	1.172	1.238	0.907	0.944	0.815	0.954
	(0.082)	(0.088)	(0.187)	(0.202)	(0.092)	(0.097)	(0.164)	(0.177)
PIAT math	1.015*	1.016*	0.999	0.999	1.031***	1.031***	1.007	1.042*
	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)	(0.011)	(0.027)	(0.023)
Excellent Health	1.039	1.069	1.104	1.081	1.205	1.254*	0.631***	0.710**
	(0.093)	(0.098)	(0.163)	(0.161)	(0.161)	(0.173)	(0.112)	(0.123)
Good Health	1.100	1.063	1.496**	1.446**	0.960	0.970	0.924	0.877
	(0.104)	(0.100)	(0.248)	(0.240)	(0.122)	(0.127)	(0.153)	(0.129)
Lives One Parent	0.873	0.881	0.757	0.787	1.061	1.055	0.858	0.867
	(0.124)	(0.130)	(0.182)	(0.202)	(0.237)	(0.235)	(0.245)	(0.238)
Parental Characteristics								
Mother High School	1.707	1.590	3.633	3.597	1.104	0.970	1.258	0.421
	(0.761)	(0.742)	(3.237)	(3.266)	(0.473)	(0.417)	(0.555)	(1.019)
Mother More High School	1.547	1.518	3.157	2.689	1.001	1.000	0.230	0.0300*
	(0.637)	(0.644)	(2.463)	(2.238)	(0.464)	(0.456)	(0.283)	(0.055)
Mother Part Time	1.017	1.019	1.198	1.065	1.125	1.214	0.765	0.792
	(0.144)	(0.148)	(0.240)	(0.209)	(0.212)	(0.237)	(0.247)	(0.257)
Mother Full Time	0.861	0.890	1.440**	1.419*	0.706**	0.729*	0.619*	0.601*
	(0.102)	(0.109)	(0.266)	(0.261)	(0.118)	(0.120)	(0.175)	(0.183)
Parental Income ($1982-84)	0.984	0.991	0.990	1.000	0.955	0.967	1.053	1.041
	(0.019)	(0.019)	(0.026)	(0.027)	(0.034)	(0.034)	(0.040)	(0.036)
State-Level Controls								
Abortion[a] Clinics	0.981	0.978*	0.956***	0.957**	0.982	0.980	0.987	0.980
	(0.013)	(0.012)	(0.017)	(0.017)	(0.014)	(0.013)	(0.030)	(0.028)
Birth Rates[b]	1.021*	1.021*	1.033**	1.036**	1.004	1.002	0.993	1.006
	(0.012)	(0.012)	(0.017)	(0.019)	(0.015)	(0.014)	(0.031)	(0.033)
N	2,661	2,574	1,221	1,197	885	854	555	523

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Turning to the results for the association between measures of weight and times contraceptives use proportional to times the youth had sex, Table XXXVI shows that for males, there were no significant associations between actual weight status and contraceptives use. The results for the choice variables showed that for black males, having higher scores on the substance use index was associated with a 22.1% lower expected amount of contraceptive use. For white males, higher scores on the delinquency index were associated with a 5.8% lower expected amount of contraceptive use. Being depressed was associated with a 93.3% higher expected amount of contraceptives use for Hispanic males. For black and Hispanic males, but not for white males, a higher number of dates was associated with a higher expected amount of contraceptive use.

Results for youth characteristics show that youth working status was associated with a 43.4% lower expected amount of contraceptive use for black males and with a 53.3% higher expected amount of contraceptive use for Hispanic males. Reporting excellent health status was associated with a 15.7% higher expected amount of contraceptive use for white adolescent males only. In contrast, reporting good health status was associated with a 26% and a 30% lower expected amount of contraceptive use for white and Hispanic males, respectively, but with a 22.5% higher expected amount of contraceptive use for black males. Living in single parent households was associated with a 20.5% lower expected amount of contraceptive use for white males only.

Looking at the results for parental characteristics, having a mother that completed high school or more was a protective factor for Hispanic males. Having a mother that works full time was a risk factor for all racial and ethnic male groups. In addition, living in states with higher proportions of counties not having an abortion provider was a protective factor for white and

Hispanic males. For whites, living in a state with higher adolescent pregnancy rates was also a protective factor, with a 3.1% higher expected amount of contraceptive use.

Table XXXVI: Effect of Actual Weight on Times Contraceptives Used for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Underweight	1.230	1.228	1.173	1.090	0.825	0.805	1.445	1.586
	(0.163)	(0.170)	(0.126)	(0.118)	(0.277)	(0.372)	(0.561)	(0.567)
Overweight	0.973	1.009	1.033	1.063	0.854	0.865	1.095	1.093
	(0.074)	(0.072)	(0.108)	(0.113)	(0.112)	(0.125)	(0.197)	(0.184)
Choice Variables								
Substance		0.933*		1.007		0.779**		1.031
Use Index		(0.034)		(0.037)		(0.096)		(0.067)
Delinquency		0.977		0.942**		1.027		1.062
Index		(0.028)		(0.025)		(0.064)		(0.042)
Depressed		1.033		0.787		1.262		1.933**
		(0.146)		(0.191)		(0.291)		(0.498)
Number of		1.002		1.001		1.007**		1.006***
Dates		(0.001)		(0.001)		(0.004)		(0.003)
Youth Characteristics								
Youth Works	0.879	0.870	0.899	0.806	0.601*	0.566*	1.458**	1.533***
	(0.104)	(0.111)	(0.146)	(0.127)	(0.173)	(0.168)	(0.225)	(0.231)
PIAT math	0.996	0.998	1.001	1.000	0.995	0.995	0.994	0.995
	(0.005)	(0.005)	(0.005)	(0.006)	(0.010)	(0.013)	(0.009)	(0.011)
Excellent	1.076	1.079	1.158***	1.157**	0.944	0.953	1.030	0.827
Health	(0.053)	(0.053)	(0.064)	(0.071)	(0.095)	(0.119)	(0.177)	(0.102)
Good Health	0.843**	0.864**	0.740***	0.719***	1.296***	1.225*	0.645***	0.700**
	(0.064)	(0.062)	(0.077)	(0.073)	(0.130)	(0.131)	(0.099)	(0.107)
Lives One	0.854	0.866	0.766***	0.795**	1.076	0.990	0.979	0.872
Parent	(0.084)	(0.088)	(0.076)	(0.089)	(0.316)	(0.310)	(0.202)	(0.218)
Parental Characteristics								
Mother High	0.960	1.331	1.928	1.952	0.619	0.688	22.400	251.7**
School	(0.629)	(0.893)	(1.401)	(1.442)	(0.346)	(0.429)	(50.050)	(602.200)
Mother More	0.916	0.852	0.876	0.860	0.700	0.958	649.7***	1,397***
High School	(0.544)	(0.521)	(0.557)	(0.559)	(0.331)	(0.544)	(1192.00)	(2811.00)
Mother Part	0.905	0.965	0.864	0.897	0.764	0.795	0.609**	0.627*
Time	(0.093)	(0.106)	(0.115)	(0.133)	(0.129)	(0.134)	(0.123)	(0.153)
Mother Full	0.725***	0.734***	0.675***	0.648***	0.774*	0.757**	0.632**	0.587**
Time	(0.063)	(0.070)	(0.086)	(0.083)	(0.102)	(0.104)	(0.137)	(0.123)
Parental Income	0.986	0.995	1.007	1.008	0.946**	0.931***	0.977	1.005
($1982-84)	(0.011)	(0.010)	(0.011)	(0.011)	(0.023)	(0.022)	(0.032)	(0.025)
State-Level Controls								
Abortion[a]	0.996	1.002	1.014	1.030*	0.985	0.993	1.105***	1.117***
Clinics	(0.013)	(0.013)	(0.015)	(0.016)	(0.017)	(0.019)	(0.042)	(0.045)
Birth Rates[b]	0.995	0.998	1.027**	1.031***	0.978	0.988	0.986	0.983
	(0.011)	(0.010)	(0.011)	(0.010)	(0.024)	(0.026)	(0.019)	(0.020)
N	2,484	2,409	1,139	1,120	833	803	512	486

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Table XXXVII shows the results for the association between male weight perceptions and times contraceptives were used proportional to times the youth had sex. Results showed that for the whole sample, perceiving one's weight as underweight was associated with a 14.5% lower expected amount of contraceptive use. However, when analyses were undertaken by racial/ethnic subgroups, results showed no association between perceptions of weight and contraceptive use for white males. For black males, perceiving one's weight as overweight was associated with a 80.3% higher expected amount of contraceptive use. For Hispanic males, perceiving one's weight as underweight was associated with a 21.9% lower expected amount of contraceptive use. The magnitude and significance of the other covariates were similar to that shown in Table XXXVI.

Table XXXVII: Effect of Perceived Weight on Times Contraceptives Used for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Perceived	0.856*	0.855*	0.924	0.966	1.169	1.098	0.829	0.781*
Underweight	(0.070)	(0.069)	(0.088)	(0.097)	(0.217)	(0.207)	(0.103)	(0.102)
Perceived	1.073	1.060	0.943	0.926	1.694**	1.803***	1.021	1.181
Overweight	(0.091)	(0.094)	(0.086)	(0.084)	(0.349)	(0.385)	(0.122)	(0.176)
Choice Variables								
Substance		0.933*		1.004		0.792**		1.021
Use Index		(0.033)		(0.037)		(0.091)		(0.070)
Delinquency		0.977		0.943**		1.020		1.064
Index		(0.028)		(0.025)		(0.062)		(0.043)
Depressed		1.037		0.787		1.683**		2.057***
		(0.147)		(0.188)		(0.355)		(0.540)
Number of		1.001		1.001		1.007**		1.007***
Dates		(0.001)		(0.001)		(0.004)		(0.003)
Youth Characteristics								
Youth Works	0.878	0.868	0.894	0.801	0.599*	0.557*	1.497**	1.603***
	(0.104)	(0.111)	(0.146)	(0.126)	(0.174)	(0.167)	(0.238)	(0.257)
PIAT math	0.995	0.997	1.002	1.001	0.987	0.985	0.990	0.991
	(0.004)	(0.005)	(0.005)	(0.006)	(0.010)	(0.014)	(0.009)	(0.012)
Excellent	1.075	1.078	1.150**	1.142**	1.015	1.051	1.022	0.830
Health	(0.053)	(0.054)	(0.064)	(0.068)	(0.107)	(0.110)	(0.175)	(0.103)
Good Health	0.851**	0.873*	0.741***	0.717***	1.437***	1.344***	0.654***	0.711***
	(0.066)	(0.065)	(0.077)	(0.073)	(0.164)	(0.141)	(0.094)	(0.093)
Lives One	0.845*	0.857	0.762***	0.786**	1.011	0.883	0.953	0.837
Parent	(0.080)	(0.084)	(0.077)	(0.092)	(0.304)	(0.298)	(0.193)	(0.190)
Parental Characteristics								
Mother High	0.957	1.305	1.852	1.869	0.592	0.645	13.360	60.57**
School	(0.631)	(0.878)	(1.315)	(1.346)	(0.307)	(0.369)	(27.190)	(125.600)
Mother More	0.958	0.878	0.848	0.815	0.734	1.032	367.3***	365.6***
High School	(0.580)	(0.545)	(0.539)	(0.528)	(0.329)	(0.542)	(583.900)	(595.400)
Mother Part	0.894	0.953	0.845	0.887	0.793	0.893	0.635**	0.651**
Time	(0.090)	(0.102)	(0.113)	(0.130)	(0.137)	(0.157)	(0.114)	(0.134)
Mother Full	0.725***	0.734***	0.673***	0.652***	0.906	0.890	0.647**	0.616**
Time	(0.063)	(0.070)	(0.086)	(0.084)	(0.116)	(0.127)	(0.139)	(0.130)
Parental Income	0.987	0.995	1.006	1.007	0.938***	0.917***	0.972	1.001
($1982-84)	(0.010)	(0.010)	(0.012)	(0.011)	(0.021)	(0.021)	(0.032)	(0.024)
State-Level Controls								
Abortion[a]	0.995	1.001	1.015	1.032**	0.984	0.996	1.089**	1.083**
Clinics	(0.012)	(0.013)	(0.015)	(0.016)	(0.016)	(0.018)	(0.037)	(0.036)
Birth Rates[b]	0.995	0.998	1.027**	1.031***	0.977	0.987	0.987	0.980
	(0.011)	(0.010)	(0.011)	(0.010)	(0.023)	(0.025)	(0.020)	(0.019)
N	2,484	2,409	1,139	1,120	833	803	512	486

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio.
*Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Table XXXVIII shows the results for the association between male weight misperceptions and times contraceptives were used proportional to the times the youth had sex. Results showed no significant associations for the overall sample and for the white males subsample. For black males, misperceiving one's weight as heavier was associated with two times higher expected amount of contraceptive use as compared to black males who correctly perceived their weight. For Hispanic males, misperceiving one's weight as skinnier was associated with a 23% lower expected amount of contraceptive use. The magnitude and significance of the other covariates was similar to that discussed for Table XXXVI.

Table XXXVIII Effect of Misperceived Weight on Times Contraceptives Used for Males: FE Poisson-IRR[1] (SE)

	All		White		Black		Hispanic	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Misperceived Heavier	1.154	1.148	1.079	1.112	1.777***	2.116***	1.145	0.887
	(0.120)	(0.130)	(0.135)	(0.136)	(0.317)	(0.417)	(0.351)	(0.266)
Misperceived Skinnier	0.906	0.914	1.058	1.120	0.947	0.935	0.863	0.770***
	(0.057)	(0.059)	(0.094)	(0.102)	(0.138)	(0.131)	(0.089)	(0.069)
Choice Variables								
Substance Use Index		0.937*		1.010		0.777**		1.013
		(0.034)		(0.038)		(0.094)		(0.072)
Delinquency Index		0.976		0.940**		1.001		1.058
		(0.028)		(0.025)		(0.063)		(0.041)
Depressed		1.049		0.792		1.685**		2.108***
		(0.149)		(0.189)		(0.354)		(0.528)
Number of Dates		1.001		1.001		1.007*		1.006**
		(0.001)		(0.001)		(0.004)		(0.003)
Youth Characteristics								
Youth Works	0.875	0.864	0.892	0.799	0.592*	0.549**	1.534***	1.586***
	(0.102)	(0.109)	(0.145)	(0.124)	(0.173)	(0.164)	(0.241)	(0.240)
PIAT math	0.996	0.997	1.000	0.999	0.989	0.985	0.993	0.984
	(0.004)	(0.005)	(0.005)	(0.006)	(0.010)	(0.013)	(0.011)	(0.014)
Excellent Health	1.062	1.069	1.151**	1.161**	1.016	1.060	1.017	0.814*
	(0.053)	(0.053)	(0.063)	(0.070)	(0.103)	(0.116)	(0.181)	(0.102)
Good Health	0.856**	0.878*	0.736***	0.713***	1.503***	1.455***	0.668***	0.717**
	(0.066)	(0.065)	(0.077)	(0.072)	(0.160)	(0.152)	(0.098)	(0.100)
Lives One Parent	0.853*	0.867	0.772***	0.799**	1.020	0.873	0.972	0.865
	(0.080)	(0.085)	(0.073)	(0.086)	(0.314)	(0.292)	(0.193)	(0.191)
Parental Characteristics								
Mother High School	0.967	1.319	1.936	1.935	0.516	0.561	8.701	96.02**
	(0.646)	(0.898)	(1.400)	(1.410)	(0.286)	(0.328)	(17.760)	(206.900)
Mother More High School	0.958	0.882	0.855	0.812	0.623	0.938	247.1***	630.0***
	(0.583)	(0.551)	(0.540)	(0.517)	(0.276)	(0.476)	(397.100)	(1063.000)
Mother Part Time	0.905	0.965	0.848	0.879	0.785	0.923	0.676**	0.708*
	(0.092)	(0.104)	(0.114)	(0.130)	(0.135)	(0.161)	(0.123)	(0.140)
Mother Full Time	0.736***	0.744***	0.675***	0.648***	0.896	0.922	0.673*	0.626**
	(0.065)	(0.072)	(0.086)	(0.083)	(0.126)	(0.131)	(0.141)	(0.128)
Parental Income ($1982-84)	0.987	0.996	1.008	1.009	0.943**	0.923***	0.972	1.003
	(0.010)	(0.010)	(0.012)	(0.011)	(0.022)	(0.021)	(0.032)	(0.025)
State-Level Controls								
Abortion[a] Clinics	0.994	1.000	1.014	1.032**	0.981	0.993	1.084**	1.089***
	(0.012)	(0.013)	(0.015)	(0.016)	(0.016)	(0.017)	(0.035)	(0.035)
Birth Rates[b]	0.994	0.997	1.026**	1.030***	0.974	0.984	0.985	0.975
	(0.011)	(0.010)	(0.011)	(0.010)	(0.024)	(0.026)	(0.019)	(0.018)
N	2,483	2,409	1,138	1,120	833	803	512	486

Note: All Regressions control for year trends and residence. Standard errors are robust. [1]Incidence Risk Ratio. *Significant at $p < 0.10$; **significant at $p < 0.05$; ***significant at $p < 0.01$. [a] Percentages of counties in the state not having an abortion provider. [b] Number of pregnancies per 1,000 women aged between 15-19 years old

Discussion

Study 4 investigated the relationship between measures of weight and risky sexual behavior in a sample of US adolescent females and males using discrete time event history analyses and FE Poisson regression models. It examined the racial differences in risky sexual behaviors by integrating the social and cultural norms regarding weight and weight perceptions into its conceptual framework. Further, it attempted to account for most of the factors found to be related to adolescent sexual behaviors in the literature, as well as controlling for time-constant unobserved heterogeneity.

The first hypothesis that overweight white and underweight black and Hispanic female adolescents would be less likely to initiate early sexual debut as compared to their normal weight counterparts received partial support. Results showed that this held true for white adolescents, but no significant results were found for black and Hispanic adolescents. In addition, for the overall female adolescent sample perceptions of weight but not actual weight were significantly associated with early sexual debut. This result is in line with Cawley and colleagues' 2006 study that found no relationship between female actual weight and early sexual debut when they used NLSY97. This finding shows that when analyzing the effect of weight on risky behaviors, having multiple measures of weight, not only actual weight, may convey a more accurate picture of the actual relationships.

The second hypothesis tested in Study 4 was that overweight white females and underweight black females would be more likely to engage in risky sexual behaviors in exchange for intimacy and a more attractive partner. This hypothesis was generally supported by the current results for white females, but received only mixed support for black and Hispanic females. Specifically, results showed that white overweight and black underweight female

adolescents had a higher expected number of sexual partners than their normal-weight counterparts. In addition, perceptions of being overweight and misperceptions of being heavier for white females were both associated with higher expected number of sexual partners. These results both support Hypothesis 2. However, black females who misperceived their weight as skinnier had a lower expected number of sexual partners, which does not support Hypothesis 2. This counterintuitive finding could be explained by the fact that the misperceptions variable does not specify the group of actual weight to which is applied to. In other words, this study classified someone as misperceiving their weight as skinnier than it really was if their perception of weight was lighter than their actual weight. It could be the case that for blacks, giving the large proportion of obese youths in this racial/ethnic group, the large majority of adolescents who under-perceived their weight was composed of females at the upper tail of the weight distribution. Thus, although beauty is associated with a larger body type for blacks, it could be the case that a majority of black females who misperceive their weight as lighter than it actually was had an actual weight above the threshold of obesity, but their perceptions of personal weight made them believe that they were in the idealized weight category (overweight) and therefore they were not willing to trade off personal reputation for intimacy and a more attractive partner. To better understand the relationship between weight misperceptions and adolescent risky behaviors future studies may find it beneficial to use a more refined measure for weight misperceptions that takes into account the actual weight (i.e. as opposed to having just one category for misperceiving one's weight as skinnier three categories could be used: normal weight who thinks is underweight; overweight who thinks is normal weight or underweight; and obese who thinks is overweight, normal weight or underweight).

For Hispanics, results showed that being overweight or perceiving one's body as overweight was associated with increased number of sexual partners, which does not support Hypothesis 2. However, Hispanic females are a highly heterogeneous group regarding years since migration to the US, therefore it could be that case that these results were driven by the adolescents who were second or third generation in the US and were partially or fully acculturated, therefore adopting the thin body ideal upheld by whites. If this was the case, Hypothesis 2 does receive support. Further analyses distinguishing the Hispanic females based on years since migration to the US will shed light on this finding.

The results provide some evidence that white female adolescents whose self-perceived weight status is idealized by their social/cultural groups were more successful in negotiating safe sex than their perceived normal weight counterparts. For Hispanic females being overweight was a risk factor associated with decreased expected times of contraceptive use.

The results for the relationship between weight status and early sexual debut for males showed significant results only for minorities, which is the opposite pattern found in females. In addition, the results for males paint a more complex picture than those for females. For black males, being underweight and having underweight self-perceptions were both associated with decreased odds of early sexual debut, which support Hypothesis 3. However, black males who misperceived themselves as heavier than they were in reality also had decreased odds of early sexual debut, which does not support Hypothesis 2. This result may have arisen because large proportions of black adolescents who misperceived their bodies as heavier belong to the underweight or normal weight categories, which are not seen as beauty ideals by their racial/ethnic groups, and therefore they were unable to find partners in the market for sex. If this was the case, a more refined variable for weight misperceptions would be needed. It is also

possible that perceptions of weight are tied into perceptions of muscle mass for males. In other words, weight perceptions and misperceptions may be capturing perceptions of muscle mass, which is prized across racial/cultural groups for males. Thus, future research may find it beneficial to examine how weight status and weight perceptions relate to body fat percentage. For Hispanics, being overweight was associated with lower odds of early sexual debut while perceiving one's body as either overweight or underweight was associated with lower odds of early sexual debut, which is similar to what was expected in white males. However Hispanic males who perceived their body as either overweight or underweight had reduced odds of early sexual debut. This suggests that for Hispanic males the effect of weight measures on early sexual debut may follow an inverse U shape relationship. Future research may find it beneficial to examine measures of acculturation, such as time since family migration.

The results lend very little support to Hypothesis 4 which states that overweight white males and underweight black and Hispanic males would be less likely to engage in risky sexual behaviors, This hypothesis was built on the premises that males derive utility from risky sex and that males who were seen as unattractive by their social and cultural groups would have less bargaining power when negotiating unsafe sex. Results for white males show that being overweight was associated with decreased expected number of sexual partners, which supports Hypothesis 4. However results for black and Hispanic males did not support Hypothesis 4. For black males, being underweight was associated with an increased number of sexual partners while overweight self-perception and misperceiving one's body weight as heavier than their actual weight were associated with decreased numbers of sexual partners. In addition, black males who perceived their body as overweight or misperceived their body as heavier had increased amounts of contraceptive use. Thus, results from black males did not support

Hypothesis 4. Several competing hypotheses could explain these findings for black males. First, overweight black males may not be seen as more desirable in the market for sex and therefore overweight males may not have additional bargaining power when negotiating unsafe sex with their partners. Second, it could be the case that overweight males are seen as more desirable, but they have a stronger preference for safe sexual behaviors. Another possibility is that weight status and weight (mis)perceptions may be related to relationship status for black males. For example, underweight black males may have more difficulty entering into monogamous long-term relationships than their normal and overweight peers.

For Hispanic males, no significant associations were found between measures of weight and the expected number of sex partners. Perceiving one's weight as underweight or misperceiving one's weight as skinnier were associated with a decreased amount of contraceptive use. To the extent to which Hispanic males were acculturated and therefore adhered to the Western beliefs regarding body ideals, these results are in line with the implications of the theoretical framework.

The results for Study 4 align well with the rest of the literature that shows that age of puberty, behavioral problems, delinquency, and substance use are related with adolescent risky behaviors (Biglan et al., 1990; King et al., 2012; Mason et al., 2010; Price and Hyde, 2009). In addition support was found for the protective effect of higher scores on the PIAT math test, suggesting that adolescents who have better educational outcomes are less likely to engage in risky sexual behaviors (Lammers et al, 2000). The results showed that no religious affiliation was negatively related to early sexual debut, but only for Hispanic males. Past literature has shown that religious participation is a much stronger predictor of risky sexual debut as compared to religious affiliation. In addition it could be the case that although not affiliated with any

religious group, Hispanic's adolescents are spiritual and participate in religious practices outside organized religion.

In addition the findings of study 4 for white and black adolescents fall in line with the previous literature that shows that stricter parental control and higher family involvement are protective factors against early sexual debut (Borawski et al, 2003; Huebner et al., 2003; Jaccard et al., 1996; Miller, 2002; Romer et al., 1999).

Study 4 has several limitations. First, sample sizes were relatively small, reducing the estimating power for some analyses. Further analyses using imputations for some of the missing covariates and/or an additional dataset with lower missing responses may be needed. Second, weight and height were self-reported. Third, although this paper attempted to carefully control for variables that were shown to be associate with risky sex, and successfully controlled for time-constant heterogeneity, it did not control for time-varying heterogeneity. Therefore the current results need to be interpreted with caution. Fourth, the weight misperception variables may not adequately reflect the relationship between weight perceptions and actual weight categories. For example, future research may find it beneficial to use additional, more specific weight misperceptions categories, such as underweight who misperceives weight as normal weight, normal weight who misperceives weight as overweight, and overweight who misperceives weight as obese. Fifth, future research may find it beneficial, particularly when examining males, to use measures of body fat percentage that better account for muscle mass. For example, muscular males would be classified as overweight by BMI measures, but may correctly see themselves as having about the right weight.

Despite these limitations, Study 4 provides new evidence regarding the importance of cultural and social norms of weight and weight perceptions when analyzing sexual behaviors of

racially heterogeneous groups. The results show the importance of separately analyzing racial/ethnic groups as the meaning of attractiveness differs across racial/ethnic groups. For example, the current study showed that past research hypothesized that overweight is a risk factor for female adolescent risky sexual behaviors (Cawley et al., 2006; Averett et al., 2013), and the current study showed that this was only the case in cultures where heavier weights were stigmatized. In addition, the current study included race/cultural predictions about underweight bodies as well.

With that said, the framework proposed by Study 4 was shown to be more accurate of females than males. Thus, future research may find it beneficial to more closely examine males.

Overall, weight status, weight perceptions, and weight misperceptions were all shown to an important impact on behavior of adolescents, even those as young as 12 or 13 years old. The results suggest that efforts aimed at addressing risky sexual behaviors may need to be tailored for different racial/ethnic groups. In addition, education regarding the correct interpretation of weight may benefit those youths who misperceive their weight, both as an obesity control mechanism and as a tool in reducing risky sexual behaviors.

Overall Conclusion

This dissertation presents some of the first studies that attempt to investigate the relationship between weight misperceptions and actual weight. This dissertation also expands on past theoretical frameworks by incorporating social and cultural norms regarding ideal weight. In addition, this dissertation attempts to better understand the relationship between measures of weight and adolescent risky sexual behaviors by allowing what is defined as an attractive body to vary across racial/ethnic groups, based on social and cultural definitions of beauty. The findings presented here suggest that weight misperceptions are an important contributing factor in the development of adolescent obesity, particularly for black adolescents. Furthermore, the current findings provide some evidence that measures of weight are important associates of risky sexual behaviors. Thus, school programs aimed at teaching correct weight identification and interpretation may be an invaluable tool in addressing both the obesity crisis and risky behavior prevention. As research has shown that adolescents actual and perceived weights are both influenced by the weight status of people around them (Ali et al., 2011; Maximova et al., 2008), public health programs aimed at educating children and adolescents about correctly identifying one's weight status therefore may have spillover effects onto the wider community. Further research using longitudinal data or randomized intervention studies will be necessary to understand the full impact of weight perceptions on obesity, risky behaviors and their future life trajectory.

APPENDICES

APPENDIX A: DETERMINANTS OF OBESITY

Genetic Factors

Although much research is needed in order to decisively draw conclusions about genetic determinants of obesity, researchers agree that there exist four levels of genetic determination of obesity: genetic obesity, strong genetic predisposition, slight genetic predisposition, and genetically resistant individuals (Loos and Bouchard, 2003).

The genetic obese group comprises individuals for whom the obesity is caused by an invalidated gene which causes malfunctions in the regulation of energy balance (Loos and Bouchard, 2003; Farooqi and O'Rahilly, 2007). For these individuals the environment plays a small role in the severity of obesity. It is estimated that around 5% of obese and a large percentage of severely obese individuals fall in this category. To this date, there are 37 syndromes with known genetic map location that are responsible for obesity. Among them: Prader-Willi syndrome, Albright hereditary osteodystrophy, and Bardet-Biedl syndrome are the most known ones (Ohta et al., 1999; Loos and Bouchard, 2003).

However, genetic obesity is less prevalent than strong genetic and slight genetic predisposition. Compared with genetically obese individuals, people with strong genetic predisposition do not have a clearly identified genetic make up that leads to obesity, but a multitudes of alleles at various loci (Loos and Bouchard, 2003). In a non-obesogenic environment they will be overweight, and will become severely obese in an obesogenic environment. In contrast, individuals with slight genetic predisposition will be normal weight or slightly overweight in a non –obesogenic environment and some of them will be overweight in an obesogenic environment (Loos and Bouchard, 2003). As opposed to these categories,

individuals who are genetically resistant to obesity will remain normal weight regardless of the environment in which they live.

As mentioned before, with the exception of genetically obese and genetically resistant to obesity individuals (which combined represent a relatively small fraction of the population), environmental factors play a major role in obesity prevalence.

Socioeconomic Status

The relationship between socioeconomic status and overweight is complex and varies by race and gender (Beydoun & Wang, 2007; Gordon-Larsen, Adair, & Popkin, 2003; Shrewsbury & Wardle, 2008; Sobal & Stunkard, 1989; Wang, Monteiro, & Popkin, 2002; Wang & Zhang, 2006). For example, Gordon-Larsen et al. (2003) look at a cohort of adolescents enrolled in Add Health study. They find that overweight prevalence decreases with increasing SES for white female adolescents but remains high and even slightly increases for higher SES black female adolescents. There is no significant reduction in overweight prevalence with increased SES for either black or Hispanic adolescent females. Overall it seems that the racial weight gap increases with SES for females. There are no statistically differences in overweight prevalence based on parental education for male adolescents. Using simulation models in which income is equalized across all three races/ethnicities, Gordon-Larsen et al. (2003) find that even if all income and/or parental education disparities will be eliminated, the overweight prevalence gap will persist, and sometimes even increase (e.g. white-black gap for females). This suggests that other factors besides income and/or parental education are important in explaining the overweight prevalence gap.

Another study that focuses on children aged 9-10 years old, finds that there is a negative relationship between SES and overweight for white girls, but no clear relationship for black girls

(Kimm et al., 1996). Wang and Zhang (2006) find strong inverse relationship between SES and overweight for white teen girls, but not for boys. Consistent with Gordon-Larsen et al. (2003) findings, they report an increased risk for overweight for black adolescent females who belong to higher SES (38% vs. 19%, and 25% for high, middle, and low SES black adolescents respectively). Reviews of the literature show that compared to adults, the relationship between SES and obesity is weaker for children, and even more so for children of ethnic minorities (McLaren, 2007; Sobal and Stunkard, 1989).

In summary, the literature results are mixed, but they tend to suggest that there is an inverse relationship between SES and overweight prevalence for white girls. For black and Hispanic girls, the results are unclear, with some studies finding a positive relationship between SES and overweight prevalence, and other studies being inconclusive about this relationship. NO clear pattern of associations is found for boys. Overall, it seems that the racial/ethnic weight gap tends to increase with SES status for girls.

The Food Environment

The increasing trends in obesity over time have been paralleled by changes in the relative cost of food. These relative cost changes are related to technological advances which helped developing new methods of preservation, increasing the durability of fresh, partly, or fully cooked foods. It is calculated that the real price of food decreased consistently, by an average of 0.2 percentage points annually (Cutler et al., 2003; Drewnowski and Darmon, 2005; Lakdawalla & Philipson, 2002;). In addition, the price of high density foods decreased faster than the price of fruits and vegetables (Putnam et al., 2002; Putnum and Allshouse, 1999).

Prentice and Jebb (2003) show that most fast foods have high energy density, with an average meal having 145% higher energy density than the levels against which human weight

regulatory systems develop. They argue that this challenges the human appetite controls which may fail to recognize the increase in energy intake (Prentice and Jebb, 2003). Several studies find that fast food consumption is associated with higher weight outcomes. For example, Thompson and colleagues (2003) show that girls who eat fast food twice or more a week have higher BMI increase when compared with girls who eat once a week or who do not eat at all fast food (see also Binkley et al., 2000; Bowman and Vinyard, 2004; French et al., 2001). In addition, there is evidence that fast food prices are negatively related to adolescent weight outcomes (Auld and Powell, 2009; Chou et al., 2004; Chou et al., 2008; Monheit et al., 2007; Powell, 2009; Powell et al., 2007) , while fruit and vegetable prices are positively related to children's weight outcomes (Powell and Bao, 2009; Sturm and Datar, 2005; Sturm and Datar, 2008). For example, Powell (2009) finds that a one dollar increase in the price of fast food is associated with 0.646 lower BMI units, corresponding to -0.078 fast food price elasticity. Powell (2009) finds that there are SES differences in teen's price sensitivity, with teens from middle income families and teens whose mothers completed high school or less being more price sensitive than their counterparts. Research suggests that there is no significant relationship between fast food restaurant density and adolescent weight (Auld and Powell, 2009; Chou et al., 2004; Powell and Bao, 2009; Powell, 2009; Sturm and Datar, 2005; Sturm and Datar, 2008).

Food outlet availability is another important determinant of adolescent weight. For example, Powell et al. (2007) find an inverse relationship between chain supermarket availability and overweight prevalence for adolescents. They also report a direct relationship between convenience stores availability and overweight prevalence. The effects are stronger for black teens than for their whites and Hispanic counterparts. Research also shows that minority neighborhoods tend to have lower supermarket density and higher convenience stores

availability-with as many as 4 times more supermarkets being available in white neighborhoods (Powell and Slater et al., 2007; Morland et al. 2002). In addition, Powell and colleagues (2006) find that physical activity outlets are less likely to be present in black neighborhoods, and when they are present are in lower number than in the white neighborhoods.

Years since Migration to the U.S.

There is a growing body of evidence that documents the importance of years since migration to the U.S. as determinants of overweight and obese status for Hispanic adolescents, with second and third generation in the U.S. adolescents having significant higher rates of overweight and obesity as compared to their first generation counterparts (Gordon-Larsen et al., 2003; Harris et al., 2009; Kandula et al., 2004; Popkin & Udry, 1998; Mendoza & Dixon, 1999). For example, using a nationally representative sample of 13, 783 adolescents, Popkin and Udry (1998) find that 26% and 23.1% of first generation in the U.S. Hispanic male and female adolescents, respectively were obese while 32.2% and 31% of their third generation to the U.S. counterparts males and females, respectively were obese. Similarly, Gordon-Larsen and colleagues (2003) find that longer U.S. residence was associated with increased overweight among Puerto Ricans and Cubans. Using a sample of 8,613 adolescents who participated in the National Longitudinal Study of Adolescent Health, Gordon –Larsen and colleagues (2003) also showed that controlling for acculturation and proximate factors increased overweight among foreign-born adolescents, but had minimal impact for U.S.-born adolescents.

Using a nationally representative sample of over 20,000 adolescents who participated in the National Longitudinal Study of Adolescent Health, Harris and colleagues (2009) found that Second and third generation Hispanic immigrants experienced more rapidly increasing BMI from adolescence into young adulthood as compared to their first-generation counterparts. In

addition, research showed that in general, foreign-born Hispanics have healthier dietary intakes than their U.S.-born counterparts (Guendelman & Abrams, 1995; Schaffer et al., 1998; Winkleby et al., 1994).

Overall evidence shows that years since migrations are important factors in obesity prevalence for Hispanic adolescents.

APPENDIX B: DETERMINANTS OF ADOLESCENT RISKY BEHAVIORS

Parental Influences

There is a large body of literature documenting parental influences on adolescents' risky sexual behaviors (Aspy et al., 2007; Biglan et al., 1990; Boislard and Poulin, 2011; Borawski, et al., 2003; Cavazos-Rehg, et al., 2010; Commendador, 2010; Ellis et al., 2012; Huebner and Howell, 2003). There are several ways in which parental influences operate. One way is through both time and monetary parental investments. Evidence shows that compared to two parents households, single parents invested relatively less in their children (Sayer et al., 2004). Literature shows that living in a single parent family was associated with increased risk for early sexual debut and other risky sexual behaviors (Feldman and Brown, 1993; Lammers et al, 2000; Miller et al., 2001; Miller, 2010; Manlove, 1998; Upchurch et al., 1999). For example, in a sample of approximately 26,000 7^{th} to 12^{th} grade students, Lammers and colleagues (2000) found that living in two-parents household was associated with 23% lower odds of early sexual debut as compared to living in a single-parent household, even after controlling for parental SES, race/ethnicity and youth school achievement. In addition, Feldman and Brown (1993) found that male adolescents who did not live with both biological parents at 11 years of age had increased odds of early sexual debut and increased number of sexual partners at age 15. Furthermore, Kiernan (1997) using a longitudinal British survey found that females from families where parents separated during their childhood were more likely to become mothers at very young ages.

Another way in which parents influence their offspring's sexual behaviors is through their amount of communication about sex (Aspy et al, 2007; Commendador, 2010; DiIorio et al., 1999; Huebner et al, 2003; Hutchinson, 2002; Hutchinson et al., 2003; Jaccard et al, 1996; Romer et al., 1999). There is evidence that discussing sex-related problems with parents is a

protective factor against risky sexual behaviors. For example, looking at a sample of 355 black youth aged 9-17 living in urban public housing, Romer and colleagues (1999) found that communicating with parents about sexual risks was associated with increased initiation of condom use and consistent condom use. In a sample of 234 19-21 years of age females, Hutchinson (2002) found that early parent-adolescent communication about sex and risky sex was associated with later age of sexual initiation, and once sex life initiated, consistent condom use. In addition, Hutchinson (2002) found that a mother-daughter discussion regarding the importance of condoms was associated with consistent condom use. Using approximately 1,000 youth aged 13-17, Aspy and colleagues (2007) found that adolescents were much less likely to have started their sexual life if in previous communications, their parents taught them to say no, and taught them about the importance of delaying sexual activity. For sexually active adolescents, Aspy and colleagues (2007) found that adolescent-parent communication about birth control was associated with increased probability of birth control. In addition, talking to the parents about birth control and STI prevention was associated with increased likelihood of birth control use.

Another way in which parents influence their children's sexual risky behavior is through parental monitoring. Evidence shows that youth living in families with higher adolescent monitoring are less likely to engage in risky sexual behaviors (Borawski et al, 2003; Huebner et al., 2003; Jaccard et al., 1996; Miller, 2010; Romer et al., 1999). For example, using a sample of approximately 700- 9th and 10th grade students, Borawski and colleagues (2003) found that youth who were able to negotiate with their parents increased unsupervised time were more likely to engage in risky sexual behaviors as well as alcohol and marijuana consumption. In addition they found that increased parental monitoring was associated with less alcohol use and consistent

condom use for male, but not for female adolescents. Huebner and colleagues (2003) analyzed a sample of 1160 adolescents from grades 7th to 12th and found that higher parental monitoring was associated with decreased number of sexual partners and increased use of condoms.

Overall, the literature shows that parents influence their children's risky sexual behaviors through several channels among which monetary and time investments, communication about sex, and monitoring seem to be some of the most important.

Substance Use

A great deal of research demonstrates that people who engage in risky sex behaviors are more likely to use drugs or abuse alcohol (Halpern-Felsher, Millstein, and Ellen, 1996; Leigh & Stall, 1993). For example, Grossman, Kaestner, and Markowitz (2004) found that adolescents who had recently gone on a drinking binge were four times as likely to have had risky sex in the last year.

Research has shown that the relationship between risky sexual behaviors and substance abuse is complex and multifaceted. Two major hypotheses, the Third Variable hypothesis and the alcohol myopia hypothesis, have both received empirical support (Halpern-Felsher, Millstein, and Ellen, 1996).

Third Variable hypothesis

The Third Variable hypothesis states that the relationship between risky sexual behavior and substance arises from a third variable, such as general deviance (Jessor & Jessor, 1977), sensation seeking (Zuckerman, 1979), and mental health disorders (Shrier et al., 2001). For example, Zuckerman (1979) has found that some people chronically seek out risky and stimulating experiences, such as hang gliding, sky diving, and drag racing. Zuckerman also has found that people high in sensation seeking are also more prone to alcohol and drug abuse as

well as risky sexual behaviors. Similarly, Jessor and Jessor (1977) found that people who do one deviant behavior are more likely to do other deviant behaviors.

Alcohol Myopia hypothesis

The Alcohol Myopia hypothesis (Steele and Joseph, 1990) states that alcohol renders a person susceptible to momentary pressures and reduces the ability to process more distal possibilities, such as pregnancy or STDs. Thus, intoxicated individuals are more likely to behave in a more risky manner if risks are less apparent than the momentary benefits. Through a metaanalysis of experimental findings, Steele and Joseph (1990) found solid support for their hypothesis. Namely, intoxicated people behaved similarly to sober ones when situations risks were obvious or minimal. However, in situations where risks were not as apparent as benefits, people behaved in a more extreme and risky manner. More recent experimental work on sexual behavior however paints a much more complex picture, with alcohol increasing, decreasing, or having no effect on sexual behavior depending on the situation and the person's beliefs about alcohol.

The Alcohol Myopia hypothesis has received much less support from longitudinal and event analysis studies. For example, Grossman and colleagues (2004) suggested that association between substance use and sexual behavior of adolescents is not causal due to a lack of consistent findings for their FE models, particularly for females (also see Rashad and Kaestner, 2004). In a review of event history analysis studies, Weinhardt and Carey (2000) suggested that, with adults, risky sexual behaviors, such as not using a condom, were no more likely under the effects of alcohol than when someone was sober. However, Weinhardt and Carey (2000) did find that sexually inexperienced adolescents did participate in more risky sexual behaviors while under the effects of alcohol.

Overall, the effects of substance use are mixed with older studies supporting a causal relationship between substance (such as alcohol or drugs) use and risky sexual behaviors, and more recent findings finding only partial support for causation.

Other Influences of Risky Sexual Behaviors

In addition to parental influences and substance use, literature shows that peer influences, depression, as well as religiosity are important determinants of adolescent risky behaviors (Ali and Dwyer, 2009; Biglan et al., 1990; DiIorio et al., 1999; Lehrer et al., 2006; Metzler et al., 1994; Sith et al., 2011).

In a recent study Ali and Dwyer (2009) showed that a 10% increase in the proportion of peers who initiate sex was associated with a 5% increase in the probability that the youth will also initiate sex, even after controlling for parent level characteristics, and other demographic parameters. In addition, Ali and Dwyer (2009) found that a 10% increase in the number of sexual partners among peers was associated with a 5% increase in the youth's sexual partners. In another study, Ali and colleagues (2011) found that a 10% increase in contraceptive use among peers was associated with a 5% increase in the likelihood of contraceptive use for youths. Looking at a sample of approximately 150 black female adolescents aged 12-19, Bachanas and colleagues (2002) found that having peers that engage in risky sexual behaviors (early sexual debut, no protection used during intercourse and multiple partners) was associated with increased probability of risky sexual behaviors for the youths themselves.

Investigating the relationship between depression and risky sex, Lehrer and colleagues (2006) used a longitudinal sample of approximately 4000 middle school and high school students, and found that for boys, severe depression at baseline was associated with no condom or birth control use at last intercourse, and substance use at last intercourse. For females,

moderate depression was associated with substance use at last intercourse. Khan and colleagues (2009) used a sample of approximately 11,000 adolescents from the National Longitudinal Survey of Adolescent Health that was observed during adolescence and adulthood, and found that reporting being depressed was associated with having multiple sexual partners for both females and males, and in addition, for males, being depressed was associated with increased incidence of STI. In a sample of black adolescent females, Seth and colleagues (2011) found that higher levels of depression were associated with no condom use during last intercourse and multiple sexual partners over 6-months follow-up. In addition, being depressed was predictive of having a main partner with concurrent partners, high fear of communication about condoms, and having intercourse while high on alcohol or drugs over 6- and 12-months follow-up .

Lastly, research shows that higher religiosity is a protective factor against risky sexual behaviors. Using a sample of adolescent black females, McCree and colleagues (2003) found that high levels of religiosity was predictive of later sexual debut, higher condom use, and better partner communication about safe sex. In a longitudinal study of black adolescents, Landor and colleagues (2011) found that at least part of the association between religiosity and risky sex was caused by religiosity predicting lower sexual permissiveness of the adolescent's friends. This effect was consistent in both males and females. Using a sample of approximately 270 black adolescents, Wills and colleagues (2003) found that religiosity was associated with both lower probability of risky sexual behaviors and alcohol consumption.

APPENDIX C

"Weight Misperceptions and Racial and Ethnic Disparities in Adolescent Female Body Mass Index." Ramona C. Krauss, Lisa M. Powell, and Roy Wada. *Journal of Obesity,* Volume 2012 (2012), Article ID 205393, 9 pages **http://dx.doi.org/10.1155/2012/205393**

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VITA

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MA in Economics, 2007

BA in Psychology and Economics, 2005
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Publications

Zenk, S.N., Powell, L.M., Odoms-Young, A., **Krauss, R.C.,** Fitzgibbon, M., Block, D., Campbell, R.T, Strode, S. (2014). Impact of the Revised Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Food Package Policy on Fruit and Vegetable Prices. *Journal of the Academy of Nutrition and Dietetics*, 114(2), 288-296.

Krauss, R.C., Powell, L.M., & Wada R. 2012. Weight Misperceptions and Racial and Ethnic Disparities in Adolescent Female Body Mass Index. *Journal of Obesity*, doi:10.1155/2012/205393..

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Lehrer, E.L., Lehrer V.L., & **Krauss R.C.** 2009. Religion and Intimate Partner Violence in Chile: Macro- and Micro-level Influences. *Social Science Research*, 38(3), 635-643.

Papers under review

Krauss, R.C., Wada, R., & Powell, L.M. 2013. Weight Under-Perceptions and Adolescent Body Mass Index: A Longitudinal Analysis.

Chriqui, J. F., **Krauss, R.C.,** Powell, L.M., Wada, R., Sansone, C., Edison, S.S., & Chaloupka, F.J. 2014. Association between state and local sales taxes on bottled water and reduced household purchasing, 2010-2012.

Working papers

Krauss, R. C. 2014. Weight, Early Sexual Debut, and Risky Sex: A Longitudinal Study of Black and White Adolescent Girls. ***Job Market Paper***.

Krauss, R. C. 2014. Weight and Smoking Revisited: Differences by Gender and Race in a Panel of Adolescents. *Working paper (part of dissertation).*

Chriqui, J. F., Nicholson, L., **Krauss, R.C.,** Powell, L.M., Sansone, C., & Chaloupka, F.J. 2013. State and Local Soda Taxes and Their Association with Household Soda Purchasing and Adult BMI. *Working paper*.

Krauss, R. C. 2013. Weight Perceptions and Actual Weight: A Longitudinal Quantile Regression Analysis. *Working paper (part of dissertation).*

Presentations

9th Annual School of Public Health Research and Practice Awards Day, April 2014: Weight, Early Sexual Debut, and Risky Sex: A Longitudinal Study of Black and White Adolescent Girls.

Midwest Economics Association Annual Meeting, March 2014: Weight, Early Sexual Debut, and Risky Sex: A Longitudinal Study of Black and White Adolescent Girls.

Minority Health in the Midwest Conference, Innovative Approaches to Building Health Equity, February 2014: Weight, Early Sexual Debut, and Risky Sex: A Longitudinal Study of Black and White Adolescent Girls.

Illinois Economics Association 43rd Annual Meetings, October 2013: Adolescents' weight, early sexual debut, and risky sex: Evidence from panel data.

Illinois Economics Association 42nd Annual Meetings, October 2012: Weight Misperceptions and Adolescent Body Mass Index: A Longitudinal Analysis.

4th Biennial Conference of the American Society of Health Economists, "*Optimizing Health and Health Care,"* 10-13 June, 2012: Weight Misperceptions and Adolescent Body Mass Index: A Longitudinal Analysis.

UIC Minority Health in the Midwest Conference, *"Translational Research: The Road from Efficacy to Equity"*, February, 2012: Weight Misperceptions and Racial and Ethnic Disparities in Adolescent Female Body Mass Index.

Illinois Economics Association 41st Annual Meetings, October 2011: Weight Misperceptions and Ethnic Obesity Disparities among Adolescent Females.

UIC Economics Seminar Series, December 2010: Perceived Weight vs. Actual Weight and the Obesity Gap: Racial and Gender Disparities in U.S. Adolescents.

Illinois Economics Association 37th Annual Meeting, October 2007: Religion and Intimate Partner Violence in Chile: Macro- and Micro- Level Influences.

Invited Presentations

Weight Misperceptions and Racial and Ethnic Disparities in Adolescent Female Body Mass Index—UIC Econ Club, March 2012.

Perceived Versus Actual Weight and Differences in BMI and Risky Behaviors: Racial and Ethnic Disparities in U.S. Female Adolescents—UIC HPA 494 Economic and Social Determinants of Health, March 2014.

Awards

Chancellor's Graduate Research Fellowship, Spring 2012, Spring 2013.

Elisabeth Bass Award, Spring 2012.

The Gilbert Bassett, Barry Chiswick, Richard Kosobud, and Houston Stokes Award, Spring 2008.

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Service

Reviewed manuscripts for *BMC Public Health Journal*

Work Experience

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II. Instructor

Department of Economics, UIC
Course: Introductory Microeconomics (ECON 120)
Fall 2006, Spring 2007, Summer 2010, Summer 2011

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Course: Intermediate Microeconomics (ECON 218);
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Professor Narsid Golic, Department of Economics, UIC
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IV. Other working experience

Pediatric Nurse, Children's Hospital Grigore Alexandrescu, Bucharest, Romania.
Spring 1994- Fall 2001

Statistical Software Proficiency

Extensive experience with STATA. Experience with SAS and R.