Title: An Examination of Weight Status and High-Risk Sexual Behaviors among Adolescents and Young Adults

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Introduction

In the United States and throughout much of the industrialized world, obesity is widely recognized as a significant and growing public health problem. Obesity is of serious concern given that it marks a range of weight that is significantly greater than what is deemed healthy for a particular height. Although extensive research points to the physical health dangers, as well as social and emotional consequences of obesity (Alley and Chang 2007; Field et al. 2001; Olshansky et al. 2005; US Department of Health and Human Services 2001), American waistlines continue to expand and the prevalence of obesity among adults and children has increased to dangerous proportions (Finkelstein et al. 2009). In fact, studies examining the National Health and Nutrition Examination Survey (NHANES) reveal that between 1980 and 2008, the prevalence of obesity in the United States more than doubled among adults and nearly tripled among youth (Flegal et al. 2010).

While much is known about the prevalence of overweight/obesity and the health costs directly associated with excess body weight, very few studies have explored the relationship between overweight/obesity and engagement in risky behaviors that may impact health outcomes indirectly. In particular, we lack an understanding of how obesity/overweight may influence the risk behaviors of adolescents and young adults. One especially important type of risk behavior for young people lies within the realm of sexual activity. The onset of sexual activity poses potentially serious risks for the health and well-being among youth (American Academy of

Pediatrics 2001) and some research suggests there may be a correlation between early sexual activity (i.e. sexual activity that begins during adolescence) and engaging in other types of risky behaviors, including experimenting with drugs, alcohol and delinquent behaviors (Orr, Beiter, and Ingersoll 1991). Engagement in high risk sexual behaviors, such as having intercourse without using contraception, engaging in sexual activity with partners who use drugs, or having multiple sexual partners during childhood and adolescence, also exposes young people to a greater risk for both physical health problems (e.g. pregnancy, STIs, non-consensual sex) and emotional health problems (e.g. depression, lowered self-esteem). Given the serious consequences associated with engagement in sexual activity, it is important to know how individual-level characteristics influence young people's risk for engaging in particularly high-risk sexual behaviors.

As such, the main purpose of this project is to assess the association between obesity/overweight and engagement in the kinds of sexual behaviors that can be especially detrimental to individuals' health and well-being among a representative sample of American youth. In addition to establishing the presence of any cross-sectional associations between weight status and risky sexual behaviors, we will also examine whether the effects associated with pediatric obesity/overweight endure throughout the transition to adulthood and are still present among young people in their early twenties. Finally, we will examine how individual characteristics, such as gender, age, race/ethnicity and immigrant status might condition the associations between weight status and sexual-risk taking behaviors.

The two primary guiding questions of this paper include: 1) Are there significant relationships between pediatric overweight/obesity and risky sexual behaviors? If so, do these relationships endure throughout adolescence and into early adulthood? 2) Does the condition of

overweight/obesity have differential implications for sexual-risk taking behaviors among youth of differing gender, age, race/ethnicity, and immigrant status?

Methods

Data

The National Longitudinal Study of Adolescent Health (Add Health), which is a nationally representative study of adolescents in grades 7 through 12 in the United States in 1995, used a multistage, stratified, school-based, cluster sampling design. This study was designed to explain the causes of adolescent health and health behavior, primarily focusing on the multiple circumstances in which they live and their outcomes in young adulthood. Included in the sample were students from 80 high schools (both public and private) and a corresponding feeder junior high or middle school. Minority ethnic groups were sampled in proportion to their size within the United States population, however smaller ethnic groups were oversampled (Harris et al. 2003)

Data for this study were collected in four consecutive waves between the years 1994 and 2008. For the purposes of this study, we will utilize data from Wave I (conducted in 1994-1995) and Wave III (conducted in 2002). In Wave I all students were between the ages of 12 to 21 years and by Wave III the students were between the ages of 18 to 28 years. Wave III data contains follow-up interviews with 14,979 original Wave I respondents and pre-test data contain an additional 218 respondents, for a total of 15,197 respondents. We will draw primarily from the extensive in-home interviews conducted in both of these waves.

The analytic sample includes all respondents who have fully completed in-home interviews for both Wave I and Wave III. After limiting our sample size to only those with completed data, our final analytic sample is 11,684 young adults. Throughout the analyses we will adjust for the Add Health's cluster sampling design. In addition, we control for differential

sampling probabilities among individuals by utilizing the Add Health grand sample weights in all estimation procedures (Chantala and Tabor 1999).

Primary Measures

Body mass index (BMI) is calculated as weight in kilograms (kg) divided by height in square meters (m^2) and will be measured at both Wave I and Wave III. For Wave I, we will use self-reports of height and weight and the BMI-for-age percentiles that are used to determine weight status (whether an individual is obese, overweight or non-overweight) will be derived using the CDC 2000 growth chart (Kuczmarski et al. 2002). Individuals will be considered *obese* if their BMI-for-age is $\geq 95^{th}$ percentile, *overweight* if their BMI-for-age is $\geq 85^{th}$ percentile and $<95^{th}$ percentile, and *non-overweight* otherwise.

At Wave III, actual height and weight measurements were taken from each respondent. These measurements will be used to create the Wave III BMI measure and the determination of weight status (obese, overweight, non-overweight) will be made using the aforementioned BMI-for-age percentiles for youth under the age of 20 and the adult standards set forth by the CDC for those aged 20 and older. Using the adult standards, we will categorize respondents aged 20 and older as *obese* if their BMI is ≥ 30, *overweight* if their BMI is <30 but ≥ 25, and *non-overweight* otherwise.

The outcome variables, risky sexual behaviors, are all taken from Wave III. We explore several dependent measures in this study and they are broken down by whether particular vaginal sexual experiences had occurred within the respondent's "lifetime/ever" or "in the last 12 months". The lifetime/ever measures include any vaginal sexual intercourse and the age at onset of vaginal sexual activity, total number of vaginal sexual partners, ever paying to have sex with someone, ever being paid to have sex with someone, and ever having sex with someone who takes or shoots street drugs.

Any vaginal intercourse is a dichotomous variable measuring whether the respondent has: ever had a vaginal sexual experience (1); and has no vaginal sexual experience (0). We then explore age at first vaginal sex and total number of lifetime vaginal sexual partners continuously. Ever paying or being paid to have sex with someone as well as ever having sex with someone who uses drugs is measured as (0,1). In regards to sexual activity that had occurred in the 12 months prior to time surveyed, we examine continuously the total number of vaginal sexual partners, the total number of vaginal sexual encounters, and the total number of times condoms were used. Finally, we examine whether respondents report using condoms during last sexual intercourse (0,1).

All demographic and background characteristics will be measured at Wave I. The measures we include are the following: age, gender, race/ethnicity, nativity status, location of residence, region of country, family income, family education, family structure and primary language spoken at home.

Table 1. Demographic and Sexual Risk Behavior Characteristics (wave 1 and wave 3), Adjusted by Sample Weights, National Longitudinal Study of Adolescent (N=11,684)

	Non-overweight W1 (N=8,584)	**Overweight W1 (N=1,815)**	**Obese W1 (N= 1,285)**	**Total (N=11,684)**
Demographic and Background Characteristics				
Age	15.478	15.177	15.284	15.410
Gender (male=1)	0.491	0.532	0.606	0.511
Race/Ethnicity				
Mexican	0.058	0.073	0.088	0.064
Cuban	0.007	0.008	0.010	0.008
Central/South American	0.028	0.030	0.028	0.028
Chinese	0.007	0.004	0.002	0.006
Filipino	0.015	0.011	0.010	0.014
Other Asian/Pacific Islander	0.026	0.024	0.012	0.024
African American/Black	0.134	0.179	0.186	0.147
European/Canadian	0.724	0.671	0.666	0.709
Nativity Status				
Foreign-born (gen1)	0.056	0.033	0.032	0.050
US-born with FB Parents (gen2)	0.096	0.112	0.099	0.098
US-born with US-born Parents (gen3)	0.848	0.858	0.869	0.852
Location of Residence				
Urban	0.258	0.253	0.224	0.254
Suburban	0.585	0.576	0.604	0.586
Rural	0.155	0.172	0.172	0.160
Region of Country				
West	0.169	0.146	0.141	0.162
Midwest	0.323	0.307	0.293	0.317
South	0.370	0.422	0.462	0.389
Northeast	0.138	0.124	0.103	0.132
Family Income				
Less than $15,000	0.109	0.147	0.156	0.120
$16-34,000	0.190	0.232	0.241	0.202
$35-59,000	0.258	0.243	0.260	0.256
$60,000 or more	0.231	0.178	0.144	0.213
Missing	0.212	0.199	0.199	0.209
Family Education				
Less than High School	0.106	0.136	0.162	0.117
High School/GED	0.295	0.346	0.346	0.312
More than High School	0.208	0.225	0.224	0.213
Missing	0.386	0.293	0.269	0.358

Family Structure				
Biological Parents	0.591	0.560	0.587	0.586
Stepparents	0.174	0.153	0.121	0.165
Single Parents	0.207	0.248	0.260	0.220
Other	0.027	0.039	0.032	0.030
Primary Language				
English	0.930	0.945	0.936	0.933
Spanish	0.041	0.044	0.061	0.044
Other	0.029	0.011	0.003	0.023
<u>Weight and Sexual Behavior Outcomes</u>				
Weight Assessments				
BMI W1, mean (sd)	20.317 (2.203)	25.279 (1.725)	31.008 (3.593)	22.307 (4.281)
BMI W3, mean (sd)	24.167 (4.115)	30.222 (5.450)	35.503 (6.667)	26.404 (6.114)
Non-overweight W3	0.670	0.194	0.069	0.527
Overweight W3	0.246	0.344	0.166	0.253
Obese W3	0.084	0.463	0.768	0.221
Sexual Behaviors W3				
Ever had vaginal sex	0.871	0.857	0.828	0.863
Age at first sex, mean (sd) *(N=10,074)*	16.506 (2.245)	16.347 (2.302)	16.355 (2.473)	16.465 (2.805)
Total # of sex partners, ever, mean (sd)	5.657 (7.564)	5.553 (7.513)	5.198 (7.791)	5.577 (7.583)
Total # of sex partners, last 12 months, mean (sd)	1.518 (2.222)	1.512 (2.262)	1.489 (2.023	1.514 (2.206)
Total # of vaginal sex encounters, last 12 months	57.367 (94.752)	55.789(96.552)	57.360 (107.49)	57.115 (96.587)
Total # of times condoms were used, last 12 months *(N=9164)* (0-4)	1.796 (1.544)	1.795 (1.594)	1.911 (1.584)	1.807 (1.557)
Condoms used during most recent vaginal sex *(N=9164)*	0.417	0.398	0.436	0.416
Ever paid for sex	0.021	0.028	0.033	0.024
Ever paid to have sex with someone	0.023	0.033	0.032	0.026
Ever had sex with someone who takes or shoots street drugs	0.016	0.014	0.016	0.016

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