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Increased Body Mass Index Associated with Increased Risky Sexual Behaviors

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Abstract

Study Objective—The increasing prevalence of adolescent obesity has led to consideration of the potential effect of obesity on risky sexual behaviors. The current study examined whether body mass index (BMI) was related to age at sexual debut, type of sexual behavior, partner number, and condom use in a population of adolescent women at high risk for obesity and risky sexual behaviors.

Study Design—Cross-sectional examination of 860 sexually active, predominantly minority, adolescent women who received medical care at an urban health center from 2007 – 2013.

Intervention—Self-reported age at sexual debut, types of sexual intercourse, number of partners and condom use was compared to clinically – assessed BMI.

Results—Body mass index was positively associated with number of sexual partners ($p = 0.001$) and history of attempted anal intercourse ($p = 0.002$). An inverse association was observed with age at first anal intercourse ($p = 0.040$).

Conclusions—In this sample of adolescent women, increased BMI was associated with riskier sexual practices at a younger age. This study suggests that overweight and obese adolescents are a vulnerable population who may need targeted sexual health counseling.

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Keywords

Adolescence; Overweight; Obese; Anal Sex; Coitarche; Risky Sexual Behavior

INTRODUCTION

Early sexual debut, defined by Zimmer-Gembeck M et al. and Epstein M et al.,^{1, 2} as before the age of fifteen has been associated with riskier sexual practices such as increased number of lifetime partners, intercourse without a condom, and anal intercourse.² These riskier practices result in increased teen pregnancy and sexually transmitted infection (STI) acquisition, inclusive of human immunodeficiency virus (HIV).³ Early sexual debut occurs more commonly in adolescent women who are minorities as well as adolescents from disadvantaged socioeconomic backgrounds.² Youth in these groups are also disproportionately impacted by the negative consequences of sexual risk taking.^{4, 5}

The question of how adolescent obesity is associated with sexual debut has been met with mixed results. Several studies suggest that adolescent obesity may be associated with younger age at sexual debut due to early acquisition of an adult body habitus and thus leading to important reproductive health consequences.^{3, 4} However, other studies have suggested that obesity delays age at sexual debut whereby obese adolescents are more often subjected to peer-victimization, inequitable social relationships, and social ostracism compared to their healthy weight counterparts.^{6–8} According to this theory, these experiences lead to lower self-esteem, worsened body image, and less perceived sexual desirability by peers thereby decreasing opportunities to engage in sexual relationships.⁹

Adolescent obesity has tripled over the last thirty years, with over one-third of adolescents classified as overweight or obese.¹⁰ This rise has been particularly swift in adolescents who are of minority or socioeconomically disadvantaged backgrounds.¹⁰ It has been suggested, however, that African-American and Hispanic women may not experience the same level of weight-based stigma as other ethnic communities.^{5, 11, 12} Therefore, the relationship between BMI and sexual behavior may differ by race with overweight and obese African-American and Hispanic young women having sexual behaviors more aligned with their healthy weight peers.^{13–16} It has also been suggested that the relation between BMI and risky sexual behavior may depend on whether the individual was previously sexually active.^{6, 13, 14}

While age at sexual debut traditionally refers to age at first vaginal intercourse, adolescents frequently engage in a variety of sexual practices including oral and anal intercourse, carrying varied risk of STI acquisition.¹⁷ Unprotected heterosexual anal intercourse is associated with 5–20 times the risk of HIV acquisition in comparison to unprotected vaginal intercourse,^{18, 19} thus necessitating the consideration of the debut for all types of intercourse when studying adolescent sexual behaviors.

Few studies of the relation between weight status and risky sexual behaviors have considered age at sexual debut for sexual practices other than vaginal intercourse. Heterosexual anal intercourse, in particular, is an understudied and increasingly common

adolescent sexual behavior.^{18, 20, 21} We sought to test whether BMI was related to age at sexual debut across oral, vaginal and anal intercourse, number of sexual partners, and condom use. We chose to study a population of urban, predominantly minority adolescent women as these women are at highest risk for both obesity and risky sexual behaviors. Based on previous studies suggesting that these adolescent women may be less stigmatized by increased BMI,^{16, 22} we hypothesize that BMI will be positively correlated with: a) risky sexual behaviors, namely younger age at sexual debut across all types of intercourse; b) increased numbers of sexual partners; and c) inconsistent condom use.

MATERIALS AND METHODS

Participants

Data was analyzed from 860 female participants enrolled between October 1, 2007 and March 1, 2013 in a parent study of human papilloma virus (HPV) infection following vaccination in inner city, minority adolescent women. Inclusion criteria for the parent study were being a female who had previously engaged in vaginal or anal intercourse. Subjects needed to have previously received the quadrivalent HPV vaccine at another facility or, if unvaccinated or incompletely vaccinated, be willing to complete the series of three doses of the vaccine. All subjects were recruited from patients who presented to an inner-city adolescent health center in an urban metropolis for routine healthcare. Written informed consent was collected from all participants prior to enrollment. This study was approved by the Institutional Review Board, with a waiver of parental consent for those under age 18 as detailed in the parent study.²³ Subjects in the parent study did not differ significantly from the adolescent health center's general patient population.²³ For subjects who received the HPV vaccine as a part of the study, vaccination was a part of routine healthcare they received at the center. They were not counseled specifically on avoiding high-risk sexual behaviors. All subjects, however, as patients of the center received comprehensive reproductive health care that included education on sexual risk reduction by qualified adolescent health providers.

Participants in this study were females ages 12 to 21 (mean = 17.7 ± 1.4 [SD]) years old. Body mass index ranged from 15.6–55.1 kg/m² (mean = 26.3 ± 6.2). Fifty percent of subjects had a BMI greater than 25 and 22.2% of subjects had a BMI greater than 30. Subjects self-identified their racial/ ethnic group and were allowed to choose more than one category. Those selecting more than one group were classified as Mixed race. Thirty-one percent of participants were Black, 21.1% of participants were Hispanic, 43.8% identified themselves as Mixed race and 4.1% reported White or other race. Low socio-economic status, defined as qualifying for free or reduced lunch within the last year, was reported by 37.7% of participants. (Table 1)

Design

This study represents secondary cross-sectional analyses utilizing baseline data from an ongoing prospective study of HPV incidence and persistence in women receiving quadrivalent HPV vaccine. Enrolled subjects completed self-reported questionnaires that contained questions about demographics, risk behaviors for HPV acquisition, vaccination

schedule at the time of baseline visit, and indicators of psychosocial functioning. An a priori power analysis was conducted for the parent study in order to ensure adequate power. All baseline data available by the time of this cross-sectional analysis were included. Although the parent study was not powered to examine the associations reported in this study, a post-hoc power analysis indicated adequate power (> 0.8) to detect the observed associations between BMI and age of sexual debut, and sexual risk behaviors reported here.

Measures

Height—Height was measured to the nearest 1 mm using a direct reading stadiometer as a part of routine clinical visits and recorded in the electronic medical record (EMR). The EMR generates an alert if the entered value differs by more than 5% from the previously entered value.

Weight—Weight was measured to the nearest 0.1 kg using a standard physician electronic scale, Health-o-Meter Professional Model number 597KL (Pelstar LLC, McCook IL), and recorded in the EMR. Participants were weighed wearing light clothing, without shoes or coats, as part of routine clinical visits.

BMI—BMI was calculated by utilizing the average of all height and weight data entered at clinical visits six months before and after a subject's entry into the study. Given that height, weight, and BMI were not collected as part of the parent research study, average BMI was used as the predictor, in order to minimize the impact of any potential EMR input errors. The decision to use absolute BMI rather than BMI percentile was made due to the diversity of age of study participants above and below the age of 20. Although BMI percentile is typically utilized clinically for anyone under 20 years old, Deitz et al. showed it is appropriate to utilize adult cutoffs to classify BMI in adolescents.²⁴

Sexual Debut—Participants answered a self-report questionnaire derived from the work of the Natural History of HPV in Young Women study, which included subjects between the ages of 18–25 years old.²⁵ Responses from this tool were also used to assess sexual behaviors and create a scale to assesses sexual risk behaviors most relevant to HPV transmission with a Cronbach α of 0.79.²⁶ Participants were asked at the baseline study visit to respond to statements questioning whether they had ever participated in vaginal intercourse, received oral sex, given oral sex, or participated in anal intercourse, as well as the age at which this behavior first occurred.

Sexual Risk Behaviors—Participants were asked if they ever attempted to have anal sex in addition to being asked about anal sex completion. For each type of intercourse, participants selected number of lifetime and recent (prior six months) sexual partners from the choices: 0, 1, 2, 3 to 4, 5 to 9, and 10 or more. Data from a free response question asking the discrete number of sex partners, across all acts, in the last 6 months (recent) was also collected. Finally, data on condom use over the last six months (recent) was collected, rated on a five-point Likert scale ranging from never to always. Responses of always or most of the time were counted as consistent condom use.

Statistical Analysis

Multiple regression models controlling for age, race, and socioeconomic status were employed. Each test was selected according to the available response options. Linear and logistic regression were employed for continuous (age at first intercourse by type and number of sex partners in the last six months across all types of intercourse) and dichotomous (anal intercourse attempt or completion) outcomes, respectively. The questionnaire provided categorical response options for certain variables that otherwise would have been dimensional variables (e.g. number of partners for each type of intercourse). For ease of interpretation, the mean BMI of participants in each partner number category was compared using ANCOVA. Bonferroni post-hoc analysis was used to correct for alpha inflation. Chi-square analysis was used to compare condom use differences between vaginal and anal intercourse. All statistical tests were run using SPSS, 20th edition, utilizing two-tailed tests with p -values <0.05 considered significant.

RESULTS

Age at Sexual Debut

Just over ninety percent (90.5%) of our participants engaged in oral intercourse, 76% had given and received oral intercourse, 12.8% received oral intercourse only and 1.7% had only given oral intercourse. Forty-one percent attempted anal intercourse and 23% completed anal intercourse. Age at sexual debut for vaginal intercourse ranged from 10–19 (mean = 14.9 ± 1.5) years. Mean ages of debut for giving and receiving oral sex were 15.9 ± 1.7 years and 15.6 ± 1.7 years, respectively. Age at first attempted anal intercourse ranged from 11 to 19 (mean = 16.6 ± 1.5) years and age for completed anal intercourse ranged from 12 to 19 (mean = 16.7 ± 1.5) years.

Body mass index was inversely associated with age at first giving oral sex ($t = -2.6$, $p = 0.009$) and age at first completion of anal intercourse ($t = -2.0$, $p = 0.042$), such that heavier patients were more likely to have engaged in these behaviors at an earlier age. BMI was not associated with age at first vaginal intercourse, age at first receiving oral intercourse, or age at first attempted anal intercourse (all p 's > 0.480). BMI was positively associated with having ever attempted anal sex ($\beta = 0.04$, $p = 0.002$) and approached statistical significance for ever having completed anal sex ($\beta = 0.03$, $p = 0.051$). It was not found to be associated with having vaginal intercourse, nor giving or receiving oral intercourse (all p 's > 0.540).

Number of Partners

Mean BMI by number of partners and intercourse type are reported in Table 2. Subjects reported between 0 and 200 (mean = 2 ± 6.9 , median = 1) recent sex partners combined for all types of intercourse.

Body mass index was positively associated with number of discrete recent sexual partners for any type of intercourse ($t = 3.2$, $p = 0.001$). Examined via ANCOVA, participants with greater numbers of anal intercourse partners over their lifetime had higher mean BMIs ($F_{3,809} = 3.1$, $p = 0.014$), as noted in Table 2. Post-hoc analyses revealed that participants who had anal intercourse with two partners in their lifetime had a mean BMI of 29.18

kg/m², while individuals who had not had anal sex had a mean BMI of 26.05 kg/m² ($p = 0.009$). Body mass index did not differ by number of lifetime partners for vaginal or oral intercourse (all p 's > 0.090). Participants with more recent male anal intercourse partners had higher mean BMIs ($F_{3,811} = 6.9, p < 0.001$). Participants who had anal sex with 1 vs. 0 partners ($p = 0.002$), 2 vs. 1 partners ($p = 0.003$), 4 vs. 0 partners ($p = 0.041$), and 3 to 4 vs. 1 partners ($p = 0.042$) all had significantly higher BMIs in post-hoc analyses. Participants with greater numbers of recent vaginal intercourse partners also had higher mean BMIs ($F_{5,781} = 2.8, p = 0.016$). The largest difference was between individuals reporting recently having intercourse with 10 or more individuals (BMI = 32.3 ± 7.6 kg/m²) and those reporting recently having zero partners (BMI = 25.1 ± 6.5 kg/m²); however, this effect was reduced to a trend when correcting for multiple comparisons ($p = 0.066$).

Condom Use

Participants reported consistent condom use 50.3% of the time for vaginal intercourse, 33% of the time for anal intercourse, and 9.2% for oral sex (Table 3). The difference in frequency of consistent condom use in vaginal and anal intercourse was statistically significant ($\chi^2 = 128.42, p < 0.001$). BMI, however, was not associated with frequency of condom use for any type of sexual activity (all p 's > 0.585).

DISCUSSION

Our study found an association between increased BMI and participation in anal intercourse, age at first participation in anal intercourse and number of anal sex partners (lifetime and recent). Heterosexual anal intercourse is an infrequently studied and poorly understood sexual practice in adolescents.^{19, 20, 27} The majority of the extant literature on this topic focuses on the practice of anal sex in readily identifiable high-risk groups such as intravenous drug users, runaways, and those exchanging intercourse for goods or services.

Historically, many have considered anal intercourse between heterosexual partners to be a sexually deviant behavior seldom practiced by adolescents.¹⁹ The prevalence of anal intercourse in our study, however, was 41% for attempting anal intercourse, 23% having completed it at least once, and 17% including it as a part of their recent sexual practice. These findings are consistent with an emerging body of literature that suggests heterosexual anal intercourse is a common sexual practice of current adolescents.^{17–21} Other research indicates that adolescent women engaging in anal intercourse tend to practice it with a known partner in a riskier context inclusive of substance use, alcohol use, or while having a concurrent partner.^{28–30} Interestingly, anal intercourse in women has been associated with depression and poor relationship negotiation skills.^{19, 20}

Heterosexual anal intercourse in adolescents has been associated with increased number of lifetime partners^{21, 30, 31} and earlier age at vaginal sexual debut.²⁸ Traditionally, the association between BMI and anal sex participation was in homosexual males with findings similar to this study.³² Our study further sought to explore the impact of BMI on this factor and found an association between increased BMI and participation in anal intercourse, age at first participation in anal intercourse and number of anal sex partners (lifetime and recent) in a less readily identifiable risk group of urban minority adolescent women. Our data suggests

that adolescents with increased BMI may be more likely to engage in anal intercourse at a younger age and with increased numbers of partners than their lower BMI counterparts. These findings are well aligned with findings by Averett et al. who found that a nationally representative sample of overweight or obese adolescent girls were 15% more likely to have ever had anal intercourse in comparison to healthy-weight peers regardless of previous vaginal intercourse.³³

Despite some previous studies suggesting that overweight or obese adolescents who engage in sexual intercourse tend to do so in a riskier context without condoms,^{14, 15, 33} our study did not find an association between BMI and condom use. Nonetheless, similar to a study by Misegades et al.,²⁹ we also observed a significant difference in condom use by participants for vaginal intercourse in comparison to anal intercourse. Women who report frequent condom use for vaginal intercourse report infrequent condom use for anal intercourse;²⁹ this implies a discordance in the risks that adolescent women attribute to unprotected anal intercourse in comparison to unprotected vaginal intercourse. Research in all sexual groups has shown that heterosexual women are the least likely to use a condom when engaging in anal intercourse.³⁴ Moreover, data has shown male partners are more likely to make an error in condom use during penile-anal intercourse in comparison to penile-vaginal intercourse.³⁵ The lack of perceived risk combined with such errors could expose females who engage in anal intercourse to an increased risk of STI and HIV acquisition.

Our study contradicts studies reporting that increased body weight delays age of sexual debut;^{7, 8, 16, 36} this difference is most likely due to history of vaginal intercourse being an inclusion criterion for this study. Studies suggest that overweight and obese adolescents who engage in sexual intercourse express their weight-based stigma differently from those who abstain or delay intercourse.^{13, 15} These findings of younger age of sexual debut for anal intercourse and giving oral intercourse are particularly interesting in a minority study population. The hypothesis that minority adolescent women with higher BMIs do not experience weight-based stigma^{16, 22} has been criticized by researchers who state that instead these stigmas manifest differently.^{11, 13, 37, 38} Our research adds support to this theory, as our minority subjects with higher BMIs engaged in vaginal intercourse at a similar age to their lower BMI peers but started anal sex earlier, which is riskier at a younger age. Giving oral intercourse at a younger age while receiving oral intercourse at a normative age is also interesting as it may indicate that overweight and obese adolescents are meeting the sexual desires of a partner at a younger age and not having those desires reciprocated. While our study does not evaluate this nuance it may be worth investigating further in the future.

Our study is limited by the relative small size of our dataset as compared to those used in some other studies.^{7, 8, 39} Our data, however, are unique in that they report on the behaviors of an understudied sexually active, urban, minority population. The use of EMR - derived BMI data rather than a measurement collected at time of enrollment into the study also limited the ability to draw further conclusions on weight status of subjects using BMI percentile. This study yielded relatively small effect sizes, implying there are other unmeasured variables that explain some of the variance in age at sexual debut and the frequency of risky sexual behaviors. These variables may include relevant psychosocial constructs that were not measured in this study, such as relationship negotiation,

victimization, and partner insistence.^{19, 40} Finally, given the cross-sectional nature of our analyses, it is important to note that the findings represent an association and therefore no implications of causality or sequential ordering between obesity and sexual practice can be made.

Despite these limitations, the reported associations between BMI and participation in anal intercourse at a younger age and with increased number of partners are consistent with the hypothesis that overweight and/ or obese females may be more likely to engage in risky sexual behaviors. Although prospective replication of these findings would be necessary before deriving clinical implications, these data may encourage providers to be more proactive in discussing safe sexual health practices with overweight and obese patients. This study further highlights that anal intercourse is commonly practiced during adolescence and that there is discordance between adolescent women's understandings of the necessity of condom use during anal intercourse in comparison to vaginal intercourse. Providers and public health officials may wish to incorporate this information into their messaging around the need for protection during anal intercourse so that it is better received by heterosexual women. Finally, because the study population was comprised of predominantly minority youth and there were significant associations between BMI and risky sexual practices, these findings add to the growing body of literature suggesting that minority adolescents are not immune to the effects of weight status on sexual practice, and that these effects may differ from their peers of other ethnicities.

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Table 1

Descriptive Statistics of the Sample

Parameter	Number (N)	Percentage (%)
Age	Mean = 17.7 ± 1.4 years	
13	1	0.1
14	15	1.7
15	50	5.8
16	101	11.7
17	176	20.5
18	226	26.3
19	261	30.3
20	29	3.4
21	1	0.1
Race/ Ethnicity		
White	8	1
Black	259	31
Hispanic	176	21.1
Mixed	366	43.8
Other	26	3.1
Socioeconomic Status		
Qualified for Free/ Reduced Lunch (Yes)	320	37.7
BMI	Mean = 26.3 ± 6.2 kg/m ²	
Less than 18.5	26	3
18.5 – 24.99	400	46.5
25 – 29.99	240	27.9
30 – 34.99	108	12.6
35 – 39.99	54	6.3
40	32	3.7
Participation in Intercourse		
Vaginal	860	100
Oral Given	669	77.8
Oral Received	764	88.8
Oral Given & Received	654	76
Anal Attempted	348	40.7
Anal Completed	194	22.9

Table 2Mean BMI (kg/m²) by Partner Category and Intercourse Type

# of Partners	Lifetime				Last 6 months			
	Vaginal N=861	Oral Received N= 859	Oral Given N=860	Anal* N= 851	Vaginal* N=858	Anal** N= 852		
0 ^a	<i>b</i>	26.34 (5.76) ^c	26.52 (6.29)	26.05 (5.94)	25.09 (6.46)	26.23 (6.06)		
1	26.08 (6.79)	25.95 (6.23)	25.57 (5.98)	26.48 (6.00)	26.04 (5.87)	26.21 (5.75)		
2	25.80 (5.15)	26.83 (6.97)	26.69 (6.00)	29.18 (8.30)	26.39 (6.53)	32.48 (9.77)		
3-4	26.63 (6.55)	26.18 (5.72)	26.06 (5.89)	27.74 (6.97)	27.65 (6.71)	42.95 (0)		
5-9	25.85 (5.56)	26.11 (5.95)	27.82 (7.05)	32.50 (0)	25.93 (4.81)	<i>b</i>		
10 or more	27.63 (6.50)	27.78 (6.42)	27.85 (7.41)	0	32.27 (7.57)	<i>b</i>		

^a A response of 0 for lifetime partners denotes having never participated in this type of intercourse.^b No participants in the study answered this response^c Data in () denotes standard deviation* *p* < 0.05 between the mean BMIs in this category** *p* < 0.01 between the mean BMIs in this category

Table 3

Frequency of Condom Use by Type of Intercourse

Condom Use	Vaginal (%)	Oral (%)	Anal (%)
Never	12.5	72	48.3
Rarely	14.9	11.3	9.1
Sometimes	22.2	7.5	9.6
Mostly	30.5	4.8	6.2
Always	19.8	4.4	26.8