Objective and Perceived Weight: Associations with Risky Adolescent Sexual Behavior

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CONTEXT: *Studies have shown that obesity is associated with increased sexual risk-taking, particularly among adolescent females, but the relationships between obesity, perceived weight and sexual risk behaviors are poorly understood.*

METHODS: *Integrative data analysis was performed that combined baseline data from the 1994–1995 National Longitudinal Study of Adolescent Health (from 17,606 respondents in grades 7–12) and the 1997 National Longitudinal Survey of Youth (from 7,752 respondents aged 12–16). Using six sexual behaviors measured in both data sets (age at first intercourse, various measures of contraceptive use and number of partners), cluster analysis was conducted that identified five distinct behavior clusters. Multivariate ordinal logistic regression analysis examined associations between adolescents' weight status (categorized as underweight, normal-weight, overweight or obese) and weight perception and their cluster membership.*

RESULTS: *Among males, being underweight, rather than normal-weight, was negatively associated with membership in increasingly risky clusters (odds ratio, 0.5), as was the perception of being overweight, as opposed to about the right weight (0.8). However, being overweight was positively associated with males' membership in increasingly risky clusters (1.3). Among females, being obese, rather than normal-weight, was negatively correlated with membership in increasingly risky clusters (0.8), while the perception of being overweight was positively correlated with such membership (1.1).*

CONCLUSIONS: *Both objective and subjective assessments of weight are associated with the clustering of risky sexual behaviors among adolescents, and these behavioral patterns differ by gender.*

The prevalence of obesity among U.S. children has been increasing for decades.[1,2] Between 1963 and 2010, the obesity rate among youth aged 12–19 increased from 5% to 34%.[2,3] This high rate is of concern because obesity during childhood has a high likelihood of persisting into and through adulthood, and because obese children, like obese adults, are at increased risk for short- and long-term health consequences.[4,5] For these reasons, childhood obesity is a major focus of public health efforts.

In addition to physical health consequences, childhood obesity has been linked to negative psychosocial consequences.[6,7] Obese adolescents are often socially marginalized, bullied and victimized by peers.[8,9] They are less likely than nonobese adolescents to report close friendships—a developmental prerequisite for developing romantic relationships—and report fewer dating and sexual experiences.[10–13] Although most studies have been conducted among college and adult women, those that have used adolescent samples have also shown a correlation between obesity and a delay in the occurrence of adolescents' first romantic and sexual relationships, with larger effects among females than among males.[12,14,15]

A related area of research has examined links between childhood obesity and sexual risk behaviors, and there are several challenges in interpreting the findings in this area. Many studies do not adequately account for key confounders that are associated with both obesity and sexual risk-taking (e.g., race, environmental characteristics). Moreover, most examine sexual risk behaviors individually despite the reality that such behaviors often co-occur, which confers greater risks for adverse sexual health outcomes.[16] Understanding how patterns of risk behaviors vary among adolescents of differing weight profiles is important for potentially informing prevention and intervention efforts.

Existing studies are also limited by their focus on physical measures of weight;[11,13] they ignore the body of evidence demonstrating that psychosocial measures of weight, such as body image and weight perception, are also associated with health risk behaviors,[17] including sexual ones. Few studies have explored the relationship between psychosocial weight constructs and sexual behaviors, or attempted to disentangle the relationship between objective and subjective measures of weight among adolescents.[15,18] This is problematic because the associations between weight, norms for physical attraction and sexual behaviors appear to involve a complex and poorly understood interplay between objective and subjective dimensions of weight.[15,18]

The goal of the current study was to expand our understanding of the complex correlations between obesity, perceived weight and sexual risk behaviors among adolescents. We used cluster analysis to identify distinct groups of adolescents on the basis of self-reported patterns of sexual risk behaviors. Associations among obesity (as measured by body mass index, or BMI), weight perception and gender were then explored. The guiding hypothesis was that both BMI and weight perception would be positively correlated with the riskiness of sexual behavior patterns and that the correlations would be significant for females, but not males.

BACKGROUND

The conceptual framework that has guided much of the research linking adolescent obesity and sexual risk behavior is predicated on economic rationality theory.[19] Adolescent dating and sexual activity is thought of as a series of rational choices by individuals bargaining for relationships in a marketplace. In this marketplace, individuals seek to maximize their social capital, which is based on appearance and reputation. Physical appearance is presumed to reflect an individual's attractiveness, and weight serves as a proxy for appearance. Reputation reflects the esteem individuals derive from their peers. Dating an attractive person improves an individual's reputation, while dating a less attractive person has the opposite effect. It may therefore be more advantageous to remain unmatched than to date someone considered unattractive and so jeopardize one's reputation. An individual's reputation is thought to be most affected by having sexual partners who are visible to peers, and less affected by having partners who can be more easily hidden. The findings that obese adolescents are less likely than nonobese adolescents to have ever had sex,[12,13] and report fewer dating and sexual partners than others,[12,13,19] are thought to be consistent with this theory.

Studies that have compared the behaviors of obese and nonobese adolescents who were sexually experienced (rather than comparing adolescents of various weight profiles regardless of sexual history) found that obesity was positively associated with risk behaviors. Compared with nonobese sexually experienced females, their obese counterparts reported earlier sexual initiation, a larger number of casual and lifetime partners, more concurrent partners, older partners, a greater frequency of alcohol use at last intercourse and lower rates of condom use.[15,18,20–23]

Economic rationality theory also contends that the reputational effects of being sexually active differ for adolescent males and females. Males gain status by being sexually active and having more sexual partners, while the opposite is true for females. Obese females face additional challenges because cultural norms favor a thin beauty ideal, and hence these individuals are stigmatized as less attractive and have fewer dating opportunities. In response to the developmentally normal social and biological motivations to form romantic relationships, obese females may engage in sexual relationships as a way of developing the emotional

closeness that is not available to them via dating relationships. In this context, they may be less willing to negotiate safer sex behaviors for fear of losing a partner, and so may be more likely to engage in sexually risky behaviors.

In light of the existing research, economic rationality theory suggests that obese females, regardless of sexual experience, may have limited social skills for navigating intimate relationships, and may therefore be involved in relationships that are qualitatively different from those of their nonobese peers.[18] However, the limited research regarding the role of perceived weight leaves us with an incomplete understanding of the relationships between cultural norms, social skills, and dating and sexual behavior.

METHODS

Integrative data analysis was performed using cross-sectional data from the baseline assessments of the National Longitudinal Study of Adolescent Health (Add Health) and the National Longitudinal Survey of Youth 1997 (NLSY97) cohort. These large, nationally representative data sets were designed to study the health behaviors of U.S. adolescents as they transitioned from adolescence to adulthood. The current analysis was approved by the institutional review board at the University of Pittsburgh.

Data

The Add Health cohort of 20,745 adolescents in grades 7–12 during the 1994–1995 school year was selected via probability sampling to be representative of U.S. adolescents attending high school. Baseline data were collected via in-home interviews, and follow-up assessments were conducted in 1996, 2001–2002 and 2008. NLSY97 is a population-based, nationally representative survey of 8,984 youth aged 12–16 in 1997 who were attending school or not in school; follow-up interviews were conducted annually through 2012.

The current analysis includes baseline data from both data sets from participants who provided valid responses to weight and height measures, sexual behavior items and a single item assessing weight perception. Both surveys used computer-assisted interviewing technology to collect data, as well as a self-interview module for the collection of sensitive information, such as sexual health history. For the Add Health data set, individuals who were missing responses for certain measures were excluded: 584 for height and weight, 10 for weight perception, 2,543 for sexual behavior and two for gender. Exclusions were also made for the NLSY97 data set: 460 for height and weight, 14 for weight perception, 684 for sexual behavior and 74 for nonresolvable inconsistencies in reported sexual behavior. The final sample sizes were 17,606 for Add Health and 7,752 for NLSY97, yielding a total sample of 25,358.

Measures

•*Sexual behaviors.* Six measures of sexual behavior that were common to both data sets were used in this analysis: whether participants had ever had penile-vaginal

intercourse, participants' age at first sexual intercourse, whether birth control was used at first intercourse, whether birth control was used in the past 12 months or at most recent intercourse, which birth control method was used most often in the past 12 months (hormonal, condom, other) and participants' lifetime number of sexual partners. In Add Health, the sexual history items were asked of all participants at baseline. In NLSY97, these items were asked only of respondents aged 14 or older at baseline. Because 40% of NLSY respondents were not old enough to be asked about their sexual history at Wave 1, and because 15% of respondents ultimately reported having had intercourse prior to age 13, we used age at first intercourse provided in the first wave at which a participant's sexual history was assessed.

To further assess the validity of the cluster analysis, we examined the distribution of seven additional sexual risk behaviors that were included only in Add Health. The first item asked, "Did you get into a sexual situation that you later regretted because you had been drinking?" Response options were "never," "once," "twice," "3–4 times," and "5 or more." The other six items were dichotomous: "The first time you had sexual intercourse, had you been drinking alcohol?"; "Were you drunk when you had sexual intercourse for the first time?"; "The most recent time you had sexual intercourse, had you been drinking alcohol?"; "Were you drunk when you had sexual intercourse most recently?"; "The first time you had sexual intercourse, had you been using drugs?"; and "The most recent time you had sexual intercourse, had you been using drugs?"

•*Body mass index.* In both data sets, BMI was calculated from self-reported height and weight, using the age- and sex-adjusted standard set by the Centers for Disease Control and Prevention.[24] Participants were classified as underweight if their BMI was below the fifth percentile; as normal-weight if it was at or above the fifth but below the 85th percentile; as overweight if it was greater than or equal to the 85th percentile, but less than the 95th percentile; and as obese if it was at or above the 95th percentile. To allow comparison with other studies, BMI data are reported using the adult BMI categories. Prior to making this decision, we performed a sensitivity analysis using both the pediatric and the adult BMI definitions; the findings were identical.

•*Weight perception.* In both data sets, respondents were asked to indicate how they perceived their weight. Response options were "very underweight," "slightly underweight," "about right," "slightly overweight" and "very overweight." Because fewer than 5% considered themselves very underweight or very overweight, responses were collapsed into three categories: underweight, about the right weight and overweight.

•*Covariates.* Many possible individual and family characteristics could have been studied; only those that were measured similarly in the two data sets were included.

We included age, sex, and race and ethnicity, as prior studies have found variations in the strength of associations between weight and sexual risk behavior on the basis of these characteristics.[15] Because the proportion of respondents who identified as Asian, American Indian or multiracial was small, we categorized race and ethnicity as white, black, Hispanic or other.

Parental education, which is a marker of socioeconomic status, has been noted to be inversely associated with the timing of sexual initiation.[25] In both data sets, this measure was recorded as the highest grade completed by an adolescent's resident mother or father.

Family structure captures the potential for parental supervision, which is negatively associated with the risk of adolescents' engagement in sexual risk behaviors.[25–30] For example, the presence of more than one parental figure in a home may increase the supervision of adolescents' free time and the opportunities to talk about sexual and reproductive health issues, thereby reducing their risk behaviors.[31] We used family structure, rather than parental supervision, because the former item was available and was measured similarly in both data sets. In Add Health, participants were asked the number of individuals in the household, whether each was male or female, and the relationship of each to the adolescent. In NLSY97, participants were asked whether they live with their mother or a mother figure; whether they live with their father or a father figure; and whether each was a biological parent, stepparent, adoptive parent, foster parent, an individual who was dating a parent or some other unrelated parental figure. For each data set, a family structure variable was created with four categories: living with two biological parents, with at least one stepparent, with a single parent or in another family type (including splitting time between two households).

Religiosity has been found to be correlated with adolescents' decision to be sexually abstinent.[32] Furthermore, greater religiosity and more frequent church attendance among adolescents have been associated with decreased sexual risk behavior, including having a lower number of sex partners and later age at first coitus.[33] Participants were asked how often they attended a place of worship; response options ranged from "never" to "once a week or more." Attendance at religious services was included as a marker of religiosity, because this item was measured similarly in the two data sets.*

Analysis
All analyses were conducted using Stata version 12.1. Descriptive analysis was performed to determine frequencies for categorical variables and means (or medians) for continuous variables separately for each data set.

We used a multistep process to identify clusters of sexual behavior. The first cluster was determined a priori and included only respondents who denied having ever had penile-vaginal intercourse.[16] Cluster analysis was then

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*Because of data loss that occurred when the contracted data use period ended, univariate findings are not presented for family structure or attendance at religious services.

performed in each data set with the remaining five sexual behaviors, using the hierarchical agglomerative method with Gower's similarity measure, which allows modeling of continuous and categorical variables that may be normally or nonnormally distributed.[34] With this approach, statistical algorithms are used to identify individuals with similar patterns of sexual behaviors, who are sequentially grouped until all individuals within the data set have been assigned to a group, called a cluster. In both data sets, a four-cluster solution yielded the best fit. A similar distribution of individuals by sexual behavior was seen across clusters in each data set. Using bivariate analysis, we qualitatively compared distributions by sexual behavior within clusters, and the five clusters (including the one consisting of youth who had not had intercourse) were then arranged in order of increasingly risky behavior, as determined by consensus among the study team. The demographic and sexual behavior characteristics of each cluster were compared using chi-square analysis or analysis of variance, as appropriate.

Ordinal logistic regression was performed on each data set to examine the association between BMI and membership in an increasingly risky sexual behavior cluster. Covariates with a significant univariate relationship with the outcome (p<.05) were entered into a multivariate model. Respondents who listed their race or ethnicity as "other" were excluded because of their small number and

heterogeneity. We performed a stratified analysis by gender, because research has consistently shown a stronger relationship between obesity and sexual risk-taking among females than among males.[9,11–15,19,22,35–37] The analyses demonstrated differences by gender; thus, only the gender-stratified results are presented. We first ran models without the weight perception measure, and then added this variable to assess its effect on the odds ratios. To adjust for differences between data sets, regression models included a fixed effect denoting which sample participants came from. Since both data sets oversampled racial and ethnic minorities, the models included this variable as a covariate. All models calculated robust standard errors.

Despite the large overall samples in the individual data sets, some models could not be run because of the small sizes of some clusters or subsamples (e.g., some racial or ethnic groups). To address this, we combined the data sets using integrative data analysis. This technique has several advantages over analyses performed on data sets separately. Of note for the current analyses, it allows formal testing of findings replicated across independent studies by modeling between-study heterogeneity; increases the frequency of low-prevalence outcomes; increases statistical power; increases overall sample heterogeneity and, therefore, generalizability; and accounts for heterogeneity due to the differences in enrollment years and sample age ranges.[38] Moreover, with the larger sample, the pooled data set provided greater stability of model estimations, reduced the influence of extreme observations and allowed the fitting of more complicated models than would have been possible with the individual data sets.

RESULTS
Sample Characteristics
Participants in the Add Health data set were older than those in the NLSY97 sample (mean age, 16.1 vs. 14.9—Table 1), and were more likely to be female (52% vs. 50%). Add Health respondents were less likely than NLSY97 respondents to be black or Hispanic (38% vs. 46%), and were more likely to have parents with postsecondary education (58% vs. 52%). In addition, Add Health participants had a higher average BMI than did NLSY97 participants (22.5 vs. 21.9), although the mean for both samples was in the normal range. Moreover, respondents in the Add Health data set were less likely than those in the NLSY97 one to perceive themselves as being about the right weight (52% vs. 57%), and were more likely to perceive themselves as overweight (31% vs. 27%).

Compared with NLSY97 participants, Add Health participants were more likely to be sexually experienced (37% vs. 24%—not shown), had a higher mean age at first intercourse (15.0 vs. 13.8) and were less likely to have used birth control at sexual initiation (64% vs. 77%), as well as in the past year or at most recent intercourse (65% vs. 78%). When asked which contraceptive they had used most in the last year, Add Health respondents were more likely than NLSY97 respondents to identify a hormonal method (34% vs. 13%) and less likely to identify condoms

TABLE 1. Selected characteristics of adolescent respondents to the 1997 National Longitudinal Survey of Youth (NLSY97) and the 1994–1995 National Longitudinal Study of Adolescent Health (Add Health)

Characteristic	NLSY97	Add Health
Demographic	(N=7,752)	(N=17,606)
Mean age (SD)	14.9 (1.4)	16.1 (1.7)
Gender		
Female	50	52
Male	50	48
Race/ethnicity		
White	51	54
Black	25	21
Hispanic	21	17
Other	4	9
Parent education level†		
<high school	17	13
High school/GED	31	29
>high school	52	58
Mean BMI (SD)	21.9 (4.3)	22.5 (4.4)
Weight perception		
Underweight	16	17
About right	57	52
Overweight	27	31
Sexual behavior‡	(N=1,860)§	(N=6,497)
Mean age at first intercourse (SD)	13.8 (1.7)	15.0 (2.1)
Used birth control at first intercourse††	77	64
Used birth control in last year/at most recent intercourse	78	65
Birth control used most in last year		
Hormonal	13	34
Condom	83	63
Other	5	3
Median no. of sexual partners (interquartile range)‡‡	3 (2–5)	4 (2–7)

†Responses were missing for 7% of the NLSY sample and 6% of the Add Health sample. ‡Among individuals who had had sexual intercourse. §Among individuals aged 14 or older. ††Responses were missing for 1% of the NLSY sample and 12% of the Add Health sample. ‡‡Responses were missing for 19% of the NLSY sample and 42% of the Add Health sample. *Notes:* Differences between data sets are all significant at p<.001. SD=standard deviation. Unless noted otherwise, figures are percentages. Percentages may not add to 100 because of rounding.

(63% vs. 83%). Finally, Add Health participants had had a higher median number of sexual partners (four vs. three).

Bivariate Differences Among Clusters

•*Sexual behavior.* Cluster 1 contained the largest proportion of the sample (67%) and comprised participants who reported never having had sexual intercourse (Table 2). Cluster 2 (19% of the sample) was at relatively low risk because its members began having intercourse at a relatively late age and had all used birth control at first intercourse and in the last year or at most recent sex. Cluster 3 (4% of the sample) was considered to be fairly low risk because members reported the highest mean age at first intercourse and had all used birth control at first sex; however, this group was also characterized by nonuse of birth control at most recent sex or in the past year. Cluster 4 (5% of the sample) was considered one of the higher risk groups because members had the earliest age at first intercourse and had not used birth control at first intercourse. Cluster 5 (6% of the sample), which represented the highest risk

group, consisted of participants who initiated sex at a relatively early age and reported no use of birth control at first or most recent intercourse.

Notably, the sexual behavior profiles of the two lower risk clusters were not universally "low-risk," while the profiles of the higher risk clusters included some low-risk behaviors. For example, patterns of birth control use in the past year or at last intercourse were mixed across clusters. None of the members of one low-risk cluster (cluster 3) and one high-risk cluster (cluster 5) reported using any method in the past year or at most recent intercourse, while all members of the other low-risk cluster and high-risk cluster did. Moreover, the types of contraceptives used varied among members of these last two groups. Compared with those in the high-risk cluster, those in the low-risk cluster were more likely to report using condoms (70% vs. 60%) and less likely to report using hormonal methods (26% vs. 37%).

Despite the variability across clusters in the reporting of sexual risk behaviors, the appropriateness of the cluster

TABLE 2. Selected characteristics of adolescents, by sexual risk behavior cluster

Characteristic	Cluster 1 (N=17,001)	Cluster 2 (N=4,701)	Cluster 3 (N=966)	Cluster 4 (N=1,294)	Cluster 5 (N=1,396)
Sexual behaviors used in cluster analysis					
Mean age at first intercourse (SD)***	na	14.8 (2.0)	15.0 (1.8)	14.2 (2.4)	14.6 (2.3)
Used birth control at first intercourse***	na	100	100	0	0
Used birth control in last year/at most recent intercourse***	na	100	0	100	0
Birth control used most in last year***,†					
Hormonal	na	26	na	37	na
Condom	na	70	na	60	na
Other	na	4	na	3	na
Median no. of sexual partners (interquartile range)***	na	3 (2–5)	4 (2–7)	4 (2–8)	4 (2–8)
Additional high-risk behaviors (Add Health only)					
Regret sexual situation because of alcohol use***	6	20	24	28	29
Drinking at first intercourse***	na	10	12	14	15
Drunk at first intercourse***	na	40	52	59	60
Drinking at most recent intercourse*,‡	na	11	11	13	15
Drunk at most recent intercourse‡	na	49	55	43	53
Drug use at first intercourse*	na	7	6	9	10
Drug use at most recent intercourse‡	na	10	12	13	14
Demographic					
Mean age (SD)***	15.3 (1.6)	16.5 (1.6)	17.0 (1.4)	16.8 (1.5)	16.7 (1.5)
Sex					
Female***	52	49	59	48	52
Male	48	51	41	52	48
Race/ethnicity***					
White	56	50	46	45	44
Black	18	31	29	32	24
Hispanic	18	15	18	18	23
Other	8	4	7	6	8
Parent education level***,§					
<high school	13	15	18	18	21
High school/GED	28	33	33	31	37
>high school	59	52	50	51	42
Mean BMI (SD)***	22.1 (4.4)	22.7 (4.1)	23.1 (4.2)	23.0 (4.2)	23.0 (4.2)
Weight***					
Underweight	4	3	4	3	3
Normal-weight	72	75	73	73	72
Overweight	13	14	14	15	16
Obese	11	8	10	9	9
Weight perception***					
Underweight	17	16	17	19	18
About right	53	56	51	52	49
Overweight	30	28	32	29	33

*p<.05.***p<.001.†Responses were provided by 99.8% of cluster 2 and 99.9% of cluster 4 individuals.‡Asked only of individuals who reported having had sex more than once. §Most participants responded to this item: 95% in cluster 1, 93% in cluster 2, 90% in cluster 3, 92% in cluster 4 and 90% in cluster 5. *Notes:* SD=standard deviation. na=not applicable. Unless noted otherwise, figures are percentages. Percentages may not add to 100 because of rounding.

TABLE 3. Odds ratios (and 95% confidence intervals) from multivariate ordinal logistic regression analysis assessing the association between selected characteristics and adolescents' membership in increasingly high-risk clusters, by gender

Characteristic	Male		Female	
	Model 1	Model 2	Model 1	Model 2
Race/ethnicity				
White (ref)	1.00	1.00	1.00	1.00
Black	2.62 (2.37–2.91)	2.57 (2.32–2.86)	1.37 (1.24–1.51)	1.39 (1.26–1.54)
Hispanic	1.40 (1.24–1.58)	1.40 (1.24–1.59)	0.79 (0.69–0.90)	0.79 (0.69–0.90)
Weight				
Normal-weight (ref)	1.00	1.00	1.00	1.00
Underweight	0.50 (0.38–0.64)	0.49 (0.38–0.64)	0.99 (0.79–1.27)	1.04 (0.81–1.33)
Overweight	1.16 (1.03–1.30)	1.28 (1.12–1.45)	1.09 (0.96–1.24)	1.03 (0.89–1.18)
Obese	0.84 (0.73–0.97)	1.01 (0.85–1.20)	0.82 (0.69–0.98)	0.76 (0.63–0.92)
Weight perception				
About right (ref)	na	1.00	na	1.00
Underweight	na	0.99 (0.89–1.11)	na	0.98 (0.85–1.13)
Overweight	na	0.78 (0.68–0.89)	na	1.12 (1.01–1.24)

Notes: All models adjusted for age, parent education, religious service attendance and family structure. ref=reference group. na=not applicable.

ordering was supported by the data on the seven additional risk behaviors reported in Add Health. In general, the frequency of all seven behaviors increased from cluster 2 through cluster 5. Significant differences were noted for five behaviors: regretting a sexual situation because of alcohol use, drinking at first intercourse, being drunk at first intercourse, drinking at most recent intercourse and drug use at most recent intercourse.

•*Demographic and weight characteristics.* The five clusters differed in their demographic characteristics, as well as in their BMI and perceived weight. Members of cluster 1 were significantly younger than members of the other four clusters (mean age, 15.3, compared with 16.5–17.0). Cluster 1 had the largest proportion of members who were white (56% vs. 44–50%), while its proportion of members who were black was the smallest (18% vs. 24–32%). In fact, the proportion of white participants decreased, while the proportion of black and Hispanic participants generally increased, as the sexual risk profile of the clusters increased. Cluster 1 had the highest proportion of parents with post-secondary education (59% vs. 42–52%). In general, the proportion of parents who were less educated increased, and the proportion who were more educated decreased, as the sexual risk profile of the clusters increased.

Cluster 1 had the lowest mean BMI, but its members were the most likely to be obese (11%, compared with 8–10% for clusters 2–5). The mean BMI largely increased as the risk profile of the clusters rose (from 22.1 to 23.0). Although weight perception differed significantly among the clusters, these differences may not be clinically meaningful; approximately half the members of each cluster perceived their weight to be about right, and a third perceived themselves to be overweight.

Multivariate Associations

In the multivariate ordinal logistic regression analysis, race and ethnicity had the strongest associations with cluster membership, and gender moderated these associations

(Table 3). Compared with white adolescents, blacks were more likely to be represented in higher risk clusters, and we found greater differentials among males than among females (odds ratios, 2.6 and 1.4, respectively). Hispanic males were more likely, while Hispanic females were less likely, than their white counterparts to be represented in higher risk clusters (1.4 and 0.8, respectively).

Similarly, BMI was associated with cluster membership, but results differed by gender. Being overweight, rather than normal-weight, was associated with an increased likelihood of males' being in a higher risk cluster (odds ratio, 1.2), but was not significant for females. Being underweight or obese was associated with a reduced likelihood of being in a higher risk cluster for males (0.5 and 0.8, respectively), while only being obese was associated with reduced risk for females (0.8).

When weight perception was added to the models, the likelihood of being in a higher risk cluster further increased for overweight males (odds ratio, 1.3), while being overweight remained nonsignificant for females. Among males, the association with being underweight was nearly unchanged (0.5), and the association with obesity disappeared. Finally, the likelihood of obese females' being in a higher risk cluster was further reduced (0.8).

Weight perception was linked to cluster membership for males and females, but the direction of the association differed. Compared with individuals who thought they were about the right weight, males who perceived themselves to be overweight were less likely to fall into a higher risk cluster (odds ratio, 0.8), while females who perceived themselves to be overweight were more likely to do so (1.1). We found no associations between perception of being underweight and cluster membership for either gender.

DISCUSSION

Consistent with previous research,[11–15] weight was found to be correlated with clustering of adolescent sexual risk behaviors, and this relationship varied by gender. Among males, but not females, being overweight was associated with an increased likelihood of being in a higher risk cluster, while among both genders, obesity was linked to a reduced likelihood of such membership. Notably, perceiving oneself as overweight was associated with increased odds of being in an increasingly risky cluster for females, but with reduced odds for males. That perceived weight, rather than actual obesity, was associated with sexual risk-taking behaviors among females suggests that the internalization of negative stereotypes regarding physical attractiveness may be important in addition to (or perhaps rather than) actual weight. This finding represents another step toward disentangling the complex relationships among weight (both perceived and actual), gender and adolescent sexual risk behaviors. Overall, these findings emphasize the importance of considering the gendered and psychosocial context in which sexual behaviors occur, and likely reflect gender- and weight-based cultural norms

regarding physical attractiveness that adolescents internalize. However, our cross-sectional analysis and inability to include a larger body of explanatory variables preclude us from making statements regarding temporal ordering.

In contrast to previous studies,[15,18,21,22,39] ours found that obesity was not associated with higher risk sexual behaviors among adolescent females; indeed, obese females had reduced odds of reporting high-risk behaviors. There are several reasons why our findings may differ from those of prior studies. First, we divided adolescents into non–sexually experienced youth and sexually experienced ones, who were further distinguished by their patterns of risk-taking behaviors. This approach focused on the co-occurrence of risk behaviors. The fact that some prior studies found a correlation between obesity and sexual risk-taking among females highlights the importance of considering patterns of risk-taking, rather than individual behaviors. Second, the inclusion of BMI and perceived weight in models allowed us to examine how these dimensions affected one another. When both were controlled for, the perception of being overweight was correlated with females' increased sexual risk-taking behavior, while obesity was correlated with reduced risky behavior. Hence, greater attention should be directed at exploring how internal cognitive processes related to an individual's weight may influence sexual behaviors.

When interpreting these findings, it is important to recognize that the association between obesity and risky sexual behavior may vary depending on age at sexual initiation, a possibility that this analysis could not fully account for. In addition, our findings may have differed had we considered alternative sexual behaviors (e.g., having concurrent partners, engaging in nonvaginal sexual behaviors or engaging in substance use during sexual activity) or alternative subjective measures of weight (e.g., body image or body objectification).

Regardless, our findings highlight how cultural norms linking attractiveness and thinness are related to adolescent sexual behaviors. However, these findings do not tell us why these associations exist. That women's perception of being overweight, rather than actually being overweight or obese, was associated with riskier patterns of sexual behavior adds a new dimension to economic rationality theory. The finding that obese females had a reduced likelihood of engaging in risky sexual behaviors may reflect that they are more likely than others to delay sexual initiation (as evidenced by the overrepresentation of obese individuals in our non–sexually experienced cluster). By delaying initiation, perhaps they become sexually experienced at an age when their sexual decision-making skills are more developed, and hence they are less likely to engage in high-risk behaviors. Although our analysis cannot answer these questions, it does suggest that future research look beyond assumptions that obesity itself drives sexual risk behavior, and consider the more nuanced cultural, developmental and relational context in which adolescents make sexual decisions.

Our findings linking the actual and perceived overweight measure to patterns of sexual risk-taking among males are unlikely to reflect underlying deficits in their sexual negotiation capacity. Rather, they more likely reflect an opportunity advantage for adolescent males. Those who are or perceive themselves to be overweight (but not obese) may have greater lean muscle mass, not greater fat mass.[40] This greater muscle mass may be a marker of physical attraction for adolescent males, conferring more dating and sexual opportunities. Adolescent males who are considered more physically attractive are more likely to engage in sexual risk-taking behaviors.[41] Similarly, then, perhaps underweight males were less likely to report higher risk behavior patterns because of an opportunity disadvantage among males considered (or who consider themselves) to be less attractive.

Although our study was not designed to examine temporal relationships, it is notable that the sexual behaviors that distinguished the clusters (e.g., age at sexual initiation, contraceptive use) reflect highly modifiable factors. The behaviors that distinguished the two lower risk clusters from the two higher ones—age at sexual initiation, birth control use at first intercourse and birth control use in the past year—are amenable to intervention.[42] Adolescents' exposure to comprehensive school-based sexual education programs has been shown to be correlated with increased use of condoms and other contraceptives.[43–46] Augmenting such programs with modules designed to increase adolescents' awareness of how negative internalized emotions (e.g., poor body image, low self-esteem) may compromise one's ability to negotiate safer sexual behavior might help reduce sexual risk behaviors among women who perceive themselves to be overweight. Further research is needed to test this hypothesis.

Limitations

A number of important limitations to the current study must be acknowledged. This was a cross-sectional analysis, so directionality of the associations cannot be determined. Thus, some individuals may have engaged in sexual risk-taking before becoming overweight or obese. Also, sexual behavior was self-reported, and risky behavior could have been underestimated. However, computer-assisted self-interviewing technology was used in both surveys; this methodology has been found to increase the reporting of sensitive behaviors, and there are indications that it is effective across racial and ethnic groups.[47] Another limitation was that the timing of the BMI assessment relative to the assessment of sexual behaviors varied among participants, which may have biased the results. We focused on a young adolescent population with an overall mean age at sexual initiation that was below the national average. Findings may have differed had we examined a cohort of older adolescents or young adults, or had we used a longitudinal study design.

Our analysis did not control for variables known to confound both sexual behaviors and weight, or for a broad range

of family and socioeconomic characteristics. For example, because the measures available in each data set were markedly different, we did not control for pubertal timing, which has been associated with the timing of sexual initiation and sexual risk behaviors.[48–51] Furthermore, our measures of sexual risk behaviors did not examine dual method use for prevention of both STDs and pregnancy. Our findings may have differed had we looked at other types of sexual risk behaviors or used different measures of objective or subjective weight. Finally, we did not conduct formal statistical tests to assess whether weight perception mediates the relationship between weight and cluster membership.

Conclusions

This study adds to the growing body of research linking overweight and obesity to risky adolescent sexual behaviors. Our findings showed that both objective and subjective assessments of weight are associated with the clustering of sexual behaviors among adolescents, and that these behavioral patterns differ by gender.

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