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Romantic, Sexual, and Sexual Risk Behaviors of Adolescent Females with Severe Obesity

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Abstract

Background—There is an increasing adolescent population with severe obesity with impairments in social and romantic relationships that are seeking clinical weight management, including weight loss surgery (WLS).

Objective—To document romantic, sexual and sexual risk behaviors in a clinical sample of adolescent females with severe obesity ($BMI > 40 \text{ kg/m}^2$) compared to those of healthy weight (HW).

Methods—This multi-site study—an ancillary to a prospective longitudinal observational study documenting health in adolescents having WLS—presents pre-operative/baseline data from 108 females undergoing WLS, 68 severely obese seeking lifestyle intervention, and 118 of HW. Romantic and sexual risk behavior and birth control information sources were assessed using the Sexual Activities and Attitudes Questionnaire (SAAQ).

Conflict of Interest

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Results—Severely obese females reported engaging in fewer romantic and sexual behaviors compared to HW. Similar to HW, a subgroup (25%) of severely females were engaging in higher rates of sexual risk behaviors and reported pregnancies and sexually transmitted infections (STIs). A considerable number (28–44%) reported receiving no birth control information from physicians.

Conclusions—Discussion topics with the adolescent patient should extend beyond reproductive health needs (e.g., contraception, unintended pregnancies) to include guidance around navigating romantic and sexual health behaviors that are precursors to these outcomes.

Keywords

Severe Obesity; Sexual Behavior; Sexual Risk Behavior; Adolescents

Introduction

The prevalence of severe obesity (BMI 120% above the 95th percentile or BMI > 99th percentile for age and gender)(1) continues to rise (2). Weight loss surgery (WLS) is emerging as a safe and effective treatment for adolescent patients with severe obesity, although the majority of treatment-seekers may not consider or have access to it (3,4). Thus, there is an increasing adolescent population at considerable health risk in need of clinical care.

Adolescence is a known period when social relationships may include romantic experiences and involve greater intimacy and, for many, sexual activity. However, many adolescents with obesity show impairments in their social and romantic relationships. Relative to healthy weight (HW) adolescents, females with obesity are socially marginalized (5), considered less attractive by peers (6), less likely to date (7), and perceive themselves as less competent romantically (8). Epidemiological surveillance indicates adolescent females who are obese/ severely obese are less likely to have engaged in sexual intercourse (7,9); however, when they do, it may be in risky ways, including more sexual partners, inconsistent condom use (10), and being five times more likely to engage in sexual intercourse after substance use (11). These risk behavior patterns suggest a heightened potential for negative sexual health outcomes (e.g., sexually transmitted infections [STIs], HIV, unintended pregnancy). Of further concern, one in three adolescents who are overweight/obese receive no sexual health information during their annual health visit, with any discussion lasting 36 seconds (12).

Understanding the romantic and sexual behaviors of adolescent females with severe obesity presenting in clinical weight management settings prior to WLS proves timely, particularly given the high prevalence of comorbid gynecologic health concerns (13) with obesity and associated comorbid conditions contraindicating some contraception options (i.e., hormonal; 14). WLS in adult females is also associated with a resolution of anovulatory status (i.e., improved fertility; 15). Thus, for all females of reproductive age undergoing WLS, whether adolescent (16) or adult (17), reliable contraception is critical to avoid unintended pregnancies.

The present aims were to document romantic, sexual and sexual risk behaviors and information sources for birth control in a clinical sample of adolescent females with severe

obesity undergoing WLS or lifestyle modification. We examined (Aim 1) whether rates of romantic, sexual, and sexual risk behaviors (i.e., inconsistent birth control, HIV risk behavior) for these adolescent patients differed from a "normative" reference sample of adolescent females of HW, or between treatment types (WLS vs. lifestyle modification). Focusing specifically on those who were sexually active (i.e., had experienced sexual debut) we examined (Aim 2) whether sexual behavior and rates of sexual risk and sexual health outcomes (i.e., pregnancy, STIs) differed between groups. We also examined (Aim 3) whether self-reports of primary sources of information regarding birth control (e.g., physicians, mothers) varied by group (WLS, lifestyle modification, HW). Based on the aforementioned literature, we hypothesized that females with severe obesity would be less likely to engage in romantic and sexual behaviors and that those who have experienced sexual debut would have higher rates of HIV/sexual risk behaviors relative to females of HW. We anticipated no group differences between clinical groups. History of childhood maltreatment (18–20), race/ethnicity (21) and age (2,22) are known to be associated with sexual risk behavior and obesity in the broader literature and were controlled for in analyses.

Methods

Study Design Overview

TeenView is an ancillary study to the Teen Longitudinal Assessment of Bariatric Surgery consortium (Teen-LABS; 23), a prospective longitudinal observational cohort study executed across 5 academic medical centers in the US to document the safety and efficacy of WLS in 242 adolescent patients (80.6% female, enrollment 2007–2011). TeenView recruited two cohorts (enrollment 2008–2011): 1) Teen-LABS participants ("WLS"), and 2) a demographically similar comparison cohort of adolescents with severe obesity seeking treatment in lifestyle modification programs across the 5 Teen-LABS sites ("SOComps") to investigate psychosocial health and risk trajectories when adolescents with severe obesity do/do not undergo WLS. Study protocols were approved by the Institutional Review Board at each institution.

Participants

Current analyses utilized baseline/pre-operative data from TeenView adolescents who met the following eligibility criteria: 1) BMI > 40 kg/m²; 2) 13–18 years of age; 3) absence of special education services due to the high reading demand; 4) caregiver willing to participate; and 5) English-speaking. Of the 159 time-eligible Teen-LABS WLS participants, 14 declined and 4 were unable to participate in the study prior to WLS, leaving 141 (88.7% recruitment rate). For sibling pairs (n=2), the older sibling was excluded. For the present analyses, TeenView males (n=28) were also excluded, resulting in a final cohort of 108 WLS females.

SOComps were recruited from TeenView research registries of eligible youth within lifestyle change programs at Teen-LABS sites whose families agreed to be contacted for study enrollment if their adolescent was a demographic match (i.e., gender, race, +/– 6 months in age) to a TeenView WLS participant. Of 86 potential SOComps identified as demographic

matches, 3 declined, resulting in a final sample of 83 SOComp adolescents (96.5% recruitment rate) including 68 SOComp females.

Adolescents of HW—A reference group of females of HW (N=118; >5th to less than the 85th percentile) was obtained from Wave II of the Female Adolescent Development Study (FADS), as provided by the third author (24) in order to have a "normative" sample of females to compare to females with severe obesity. FADS is a longitudinal study investigating the effects of childhood maltreatment on sexual development in adolescent females. The FADS study design (see Noll et al. 2013; 24) included a non-maltreated sample (N=173) recruited from an outpatient health center in a Midwestern pediatric hospital with a retention rate of 97.5% over the 4 years of follow-up. Given a history of childhood maltreatment is known to be associated with sexual risk behavior and obesity (18), a finding also confirmed and controlled for in the present sample (19), we identified a comparator sample from the non-maltreated group of HW status matched to the TeenView sample on key demographic characteristics of age and race.

Procedures

After obtaining informed assent/consent, heights and weights were measured using a standardized protocol by trained research staff. Participants independently completed the assessments. Participants were informed their responses were confidential, yet with limits if key safety items were endorsed and necessitated further follow up (e.g., danger to self/ others, maltreatment).

Measures

Sexual Activities and Attitudes Questionnaire (SAAQ)—The SAAQ (18) is a selfreport measure assessing voluntary romantic, sexual and sexual risk behaviors and sources of information regarding birth control. Adolescents indicated past year and lifetime rates of romantic (i.e., *unsupervised dates, held hands, "romantic kissing," "made-out"*), sexual (i.e., *private parts felt under clothing, oral sex, sexual intercourse*), and sexual risk behaviors (i.e., *sexual intercourse in a "one night stand", without contraception, while drunk or high*). Individual items were dichotomized (1 = *engaged in the behavior with one or more partners*; 0 = *never engaged in the behavior*).

For sub-sample of females reporting having experienced sexual debut, additional analyses were completed for the following: age at first sexual intercourse (*12 years or younger; 21 years or older*); lifetime number of sexual partners (1 = 1; 5 = more than 10); number of HIV/sexual risk behaviors (e.g., *sex without a condom, sex with an IV drug user*, sum of 11 items; 1 = yes, 0 = no); birth control consistency (i.e., hormonal contraception and/or condoms; 1 = never use birth control; 6 = every time I have sex I use birth control); condom during last sexual intercourse (1 = yes; 0 = no); hormonal contraception during last sexual intercourse (1 = yes; 0 = no); having been pregnant (1 = yes; 0 = no); and contracting any STI (chlamydia, gonorrhea, syphilis, genital warts, genital herpes, Hepatitis B or C; 1 = yes; 0 = no).

All respondents reported who had provided them with information regarding birth control, including a *parent, sibling, friend, boyfriend, doctor, sexual health program,* or *on their own.* Their perceptions regarding the effectiveness of the information (*not very effective; very effective*) were coded as no information received (0), yes but the information was not effective (1), and yes and it was effective (2).

Covariates—Child maltreatment was assessed by the 28-item Child Trauma Questionnaire (CTQ; 25) which asks respondents about "*experiences they had growing up*" (1 = never true; 5 = very often true). The minimum raw score of the moderate range was used (physical abuse 10, sexual abuse 8, emotional neglect 15, physical neglect 10) and a continuous value representing the number of CM domains for which a participant's score was at or above the moderate cut point (range=0–4) was computed and dichotomized (0 = non-maltreated, 1 = maltreated). Age and race were self-reported using a demographic questionnaire during enrollment into Teen-LABS. BMI was computed (kg/m²) from measured height and weight. For descriptive purposes, BMI z-scores adjusted for age and gender were used for HW females; however, use of BMI z-scores is not a recommended metric for adolescents at the extreme tails of the BMI distribution (26). Thus, BMI was used for the severely obese groups.

Analyses

Mplus version 7 was utilized for all analyses (27). The study design (i.e., nesting of participants within data collection sites) was accounted for using specialized variable and analysis commands in Mplus to avoid Type-1 errors. Means and standard deviations or prevalences were calculated for all variables of interest. To address Aim 1, logistic regressions tested for differences in individual romantic, sexual and sexual risk behaviors between (a) each severely obese clinical group (WLS and SOComps) to HW females, and (b) WLS females to SOComps females. To address Aim 2, for sexually active females only, sexual risk behaviors, contraceptive use, pregnancy, and STIs were examined with linear or logistic regressions (when the response variables was continuous or binary, respectively) to test for differences between (a) females with severe obesity (WLS and SOComps) and HW females, and (b) WLS and SOComps females. To address the final aim, ordinal regression models were run examining group differences for sources of information. Models comparing both severely obese groups to HW females controlled for clinical site, race, age, and childhood maltreatment. Models comparing WLS and SOComp females controlled for BMI in addition to the aforementioned covariates.

Results

Sample Characteristics

Table 1 lists the demographic data for the WLS, SOComps, and HW females. Age was normally distributed [S=-0.30 (SE=0.18); K=-0.58 (SE=0.36)]. A t-test indicated that WLS females were older relative to SOComps females. BMI was non-normally distributed [S=1.12 (SE=0.23); K=0.97 (SE=0.45)]. Given non-normality, a Wilcoxon rank sum test was completed and indicated that WLS females had significantly higher BMIs relate to SOComps. Thirty-five percent of SOComps females and 18% of WLS females had

experienced childhood maltreatment which was marginally significant and thus, included as a covariate.

In the primary analyses comparing both severely obese females with HW, age was a significant predictor. Older age was associated with a greater likelihood of engaging in romantic, sexual and sexual risk behaviors (Tables 2–4). No significant associations between race/ethnicity and these behaviors were identified. Maltreatment significantly predicted sexual and high risk sexual behaviors, indicating that experiencing maltreatment, the greater likelihood of engaging in sexual and high risk sexual behaviors, but not romantic behaviors.

Past Year and Lifetime Rates of Romantic, Sexual, and Sexual Risk Behaviors

Prevalence rates, unadjusted and adjusted odds ratios (OR), and 95% confidence intervals (95% CI) for the adjusted ORs for past year and lifetime romantic, sexual and sexual risk behaviors for are presented in Table 2 by group (WLS, SOComps, HW). Relative to HW, both severely obese groups (WLS, SOComps) were less likely to have (e.g., past year or lifetime) engaged in romantic behaviors or sexual behaviors. With regard to sexual risk behaviors, both clinical groups were less likely to have had sex without contraception or engaged in sexual intercourse while using substances. Clinical groups were no more or less likely to have had a one night stand within the past year relative to HW, although females in the WLS group were significantly less likely to report one night stands in their lifetime than females of HW.

There were no significant differences between clinical groups (WLS vs. SOComps) in rates of romantic, sexual and sexual risk behaviors, with three exceptions. Relative to SOComps, WLS females were less likely to have engaged in heavy petting within the past year (OR=0.69; 95% CI=0.52–0.92), or to have ever engaged in oral sex (OR=0.74; 95% CI=0.58–0.94), sexual intercourse (OR=0.63; 95% CI=0.40–0.99) or sex without contraception (OR=0.32; 95% CI=0.19–0.53), with a trend for lifetime heavy petting (OR=0.74; 95% CI=0.54–1.00; p=0.052).

Sexual and Sexual Risk Behavior for Females who had Experienced Sexual Debut

Prevalence rates or means and standard deviations for sexual and sexual risk behaviors by group (WLS, SOComps, HW) for females who experienced sexual debut are presented in Table 3. WLS and SOComps females were similar to HW females in age at first sexual intercourse, years since sexual debut, HIV/sexual risk behaviors, and condom use during last sexual intercourse. However, relative to HW, WLS females had fewer sexual partners and were more likely to use birth control consistently, while SOComps females were less likely to use a hormonal form of birth control during last sexual intercourse.

In comparing WLS and SOComps females, WLS females were more likely to use a hormonal contraception during last sexual intercourse compared to the SOComps females (OR=2.59; 95% CI=1.28–5.24). WLS females were also more likely to report having had an STI (n=4, p<.05; no HIV) and a separate group of WLS females (n=3) reported having been pregnant.

Sources of Information for Birth Control

The most common sources of information perceived as effective for all adolescent females included physicians, mothers, self-taught, sexual education programs, and friends (Table 4). There were few statistically significant differences between groups, although WLS females, relative to HW, were less likely to perceive receiving effective birth control information from friends (OR=0.89; 95% CI=0.82–0.97) and boyfriends (OR=0.70; 95% CI=0.64–0.76), while SOComps were less likely to obtain information from education programs (OR=0.76; 95% CI=0.68–0.86).

Discussion

The present study evaluated romantic, sexual and sexual risk behaviors in a clinical population of adolescent females with severe obesity seeking WLS or lifestyle modification. As hypothesized, these groups engaged in fewer romantic and sexual behaviors compared to females of HW. However, similar to females of HW, there was a subgroup (25%) of sexually active females with severe obesity engaging in sexual risk behaviors. Unexpectedly, there were several differences between clinical subgroups. Relative to the SOComps, WLS females were less likely to report having had sexual intercourse without contraception (e.g., condom or hormonal method during last sexual intercourse) or engaging in oral sex, in their lifetime. These findings may suggest relatively safer sexual practices, including more consistent use of contraception for the WLS group. However, WLS females also reported poorer sexual health outcomes, whereby 13% had a previous pregnancy (n=3), and a separate 17.4% (n=4) had an STI prior to surgery.

The American Academy of Pediatrics recommends physician-based guidance and education on sexual and reproductive health for all adolescents (28). However, consistent with the general literature (12), there were a considerable number (28–44%) of females with severe obesity who reported receiving no information about birth control from "their doctors." While post-hoc analyses confirmed the majority (90%) of sexually active females reported receiving physician-based information, 1 in 4 females who had not yet experienced sexual debut reported they had not. Acknowledging both our reliance on patient perception/recall and that patient-provider agreement on what is discussed in a patient visit is not absolute, our finding may allude to weight bias in sexual health care. Thus, these data have clinical implications for pediatric surgical and non-surgical weight management programs. At a minimum, providers should be knowledgeable of adjunctive women/teen health referral sources.

The initial adolescent WLS outcome literature demonstrates that significant weight loss is associated with marked improvements in psychosocial functioning, including increased weight-related body-esteem, improved social relationships, and perceived romantic competence across the first two postoperative years (8). These positive outcomes imply that following WLS, adolescents likely have increased opportunities for engagement in age-normative romantic and sexual behaviors. Whether postoperative changes also include increased sexual risk taking is unknown. An initial single-site report from an adolescent WLS center reported a pregnancy rate higher than national averages for adolescents within the first two postoperative years (29), prompting adolescent guidelines regarding reliable

contraception (16), including the acceptability of the intrauterine device (17). Given the present findings, discussions with adolescent patients should extend beyond reproductive health needs (e.g., contraception, unintended pregnancies) to guidance around sexual health behaviors that are precursors to these outcomes.

Strengths of the present study include the multi-site and controlled design and the comprehensive assessment of romantic, sexual and sexual risk behaviors. However, this study is not without limitations. First, data are cross-sectional and thus, the sequence of romantic and sexual behaviors for females with severe obesity is unknown. Second, anal intercourse, a sexual risk behavior on the rise, was not addressed in the SAAQ. Additionally, the sample sizes for severely obese, sexually active females were small, reducing statistical power. Consistent with the broader WLS trends, this WLS sample is predominantly of White race (30), with the comparison group enrollment targeted to be demographically similar limiting our ability to examine racial/ethnic differences. Finally, the present work focused exclusively on female patients, given their known gynecologic and reproductive health risks and the epidemiological data indicating greater sexual risk-taking (13).

Conclusion. Teen pregnancy and STIs/HIV are serious public health problems for all adolescents. While present findings indicated females with severe obesity, may be less romantically and sexually active than their healthy weight peers, many also lack adequate physician-based counseling and education. Further, those who are sexually active may be active in more risky ways. Provider discussion with this clinical population should address not only reproductive health but also guidance around navigating romantic and sexual health behaviors that are precursors to these outcomes. Further understanding of how romantic and sexual behaviors unfold over time for adolescent females following WLS within the context of improved weight status and well-being is critically needed to inform patient care.

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Dr. Becnel conceptualized the study, executed data analyses and interpretation, drafted the initial manuscript, revised and reviewed the manuscript, and approved the final manuscript as submitted. Dr. Zeller obtained study funding, provided oversight of study execution, aided in conceptualization of the study, assisted with drafting the initial manuscript, reviewed and revised the manuscript, and approved the final manuscript as submitted. Dr. Noll provided data from the FADS study, assisted in conceptualization of the study, reviewed and revised the manuscript, and approved the final manuscript as submitted. Dr. Noll provided data from the FADS study, assisted in conceptualization of the study, reviewed and revised the manuscript, and approved the final manuscript as submitted. Drs. Reiter-Purtill and Dr. Peugh assisted with data analysis and interpretation, reviewed and revised the manuscript, and approved the final manuscript as submitted. Dr. Biro assisted with conceptualization of the study, reviewed and revised the final manuscript as submitted. Drs. Sarwer and Michalsky reviewed and revised the manuscript and approved the final manuscript as submitted.

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References

- Kelly AS, Barlow SE, Rao G, et al. Severe obesity in children and adolescents: identification, associated health risks, and treatment approaches: a scientific statement from the American Heart Association. Circulation. 2013; 128:1689–1712. [PubMed: 24016455]
- Skinner AC, Skelton JA. Prevalence and trends in obesity and severe obesity among children in the United States, 1999–2012. JAMA Pediatrics. 2014; 168:561–566. [PubMed: 24710576]
- Woolford SJ, Clark SJ, Sallinen BJ, Geiger JD, Freed GL. Bariatric surgery decision making challenges: the stability of teens' decisions and the treatment failure paradox. Pediatric Surg Int. 2012; 28:455–460.
- 4. Inge TH, Boyce TW, Lee M, et al. Access to care for adolescents seeking weight loss surgery. Obesity. 2014; 22:2593–2597. [PubMed: 25234923]
- Strauss RS, Pollack HA. Social marginalization of overweight children. Arch Pediat Adol Med. 2003; 157:746–752.
- Zeller MH, Reiter-Purtill J, Ramey C. Negative peer perceptions of obese children in the classroom environment. Obesity. 2008; 16:755–762. [PubMed: 18379560]
- Halpern CT, Udry JR, Campbell B, Suchindran C. Effects of body fat on weight concerns, dating, and sexual activity: a longitudinal analysis of black and white adolescent girls. Dev Psychol. 1999; 35:721–736. [PubMed: 10380863]
- Zeller MH, Reiter-Purtill J, Ratcliff MB, Inge TH, Noll JG. Two-year trends in psychosocial functioning after adolescent Roux-en-Y gastric bypass. Surg Obes Relat Dis. 2011; 7:727–732. [PubMed: 21497142]
- 9. Averett S, Corman H, Reichman NE. Effects of overweight on risky sexual behavior of adolescent girls. Econ Inq. 2013; 51:605–619.
- 10. Lowry R, Robin L, Kann L, Galuska DA. Associations of body mass index with sexual risk-taking and injection drug use among US high school students. J Obesity. 2014; 2014;816071.
- Ratcliff MB, Jenkins TM, Reiter-Purtill J, Noll JG, Zeller MH. Risk-taking behaviors of adolescents with extreme obesity: normative or not? Pediatrics. 2011; 127:827–834. [PubMed: 21518723]
- 12. Alexander SC, Fortenberry JD, Pollak KI, et al. Sexuality talk during adolescent health maintenance visits. JAMA Pediatrics. 2014; 168:163–169. [PubMed: 24378686]
- Wood PL, Bauman D. Gynaecological issues affecting the obese adolescent. Best practice & research Clinical obstetrics & gynaecology. 2014
- Hillman JB, Miller RJ, Inge TH. Menstrual concerns and intrauterine contraception among adolescent bariatric surgery patients. J Womens Health. 2011; 20:533–538.
- 15. Sarwer DB, Spitzer JC, Wadden TA, et al. Changes in sexual functioning and sex hormone levels in women following bariatric surgery. JAMA Surgery. 2014; 149:26–33. [PubMed: 24190440]
- Michalsky M, Reichard K, Inge T, et al. ASMBS pediatric committee best practice guidelines. Surg Obes Relat Dis. 2012; 8:1–7. [PubMed: 22030146]
- Mechanick JI, Youdim A, Jones DB, et al. Clinical practice guidelines for the perioperative nutritional, metabolic, and nonsurgical support of the bariatric surgery patient--2013 update: cosponsored by American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery. Obesity. 2013; 21(Suppl 1):S1–27. [PubMed: 23529939]

- Noll JG, Trickett PK, Putnam FW. A prospective investigation of the impact of childhood sexual abuse on the development of sexuality. J Consult Clin Psych. 2003; 71:575–586.
- 19. Zeller MH, Noll J, Sarwer D, et al. Childhood maltreatment in adolescents with severe obesity. J Pediatr Psychol. In Press.
- 20. Richardson AS, Dietz WH, Gordon-Larsen P. The assocaition between childhood sexual and physical abuse with incident adult severe obesity across 13 years of the National Longitudinal Study of Adolescent Health. Pediatr Obes. 2014; 9:351–61. [PubMed: 24115589]
- 21. Ali MM, Rizzo JA, Amialchuk A, Heiland F. Racial differences in the influence of female adolescents' body size on dating and sex. Econ Hum Bio. 2013; 12:140–152. [PubMed: 24361085]
- Cavazos-Rehg PA, Krauss MJ, Spitznagel EL, et al. Age of sexual debut among US adolescents. Contraception. 2009; 80:158–162. [PubMed: 19631791]
- Inge TH, Zeller M, Harmon C, et al. Teen-Longitudinal Assessment of Bariatric Surgery: methodological features of the first prospective multicenter study of adolescent bariatric surgery. J Pediatr Surg. 2007; 42:1969–1971. [PubMed: 18022459]
- Noll JG, Shenk CE. Teen birth rates in sexually abused and neglected females. Pediatrics. 2013; 131:e1181–1187. [PubMed: 23530173]
- 25. Bernstein D, Fink L. Childhood Trauma Questionnaire: A retrospective self-report manual. 1998.
- Woo JG. Using body mass index z-score among severely obese adolescents: A cautionary note. Int J Obesity. 2009; 4:405–410.
- 27. Muthén LK, Muthén BO. MPlus Users Guide 1998. 2011.
- 28. Hagan JF, Shaw JS, Duncan PM. Bright futures: guidelines for health supervision of infants, children, and adolescents. American Academy of Pediatrics; Elk Grove Village, IL: 2008.
- 29. Roehrig HR, Xanthakos SA, Sweeney J, Zeller MH, Inge TH. Pregnancy after gastric bypass surgery in adolescents. Obes Surg. 2007; 17:873–877. [PubMed: 17894144]
- Belle SH, Berk PD, Chapman WH, et al. Baseline characteristics of participants in the Longitudinal Assessment of Bariatric Surgery-2 (LABS-2) study. Surg Obes Relat Dis. 2013; 9:926–935. [PubMed: 23602493]

What is already known about this subject

- There is an increasing adolescent population with severe obesity with impairments in social and romantic relationships that are seeking clinical weight management, including weight loss surgery (WLS).
- Adolescence is a known period when social relationships may include romantic experiences and involve greater intimacy and, for many, sexual activity, including risky sexual behaviors.
- Adolescents with severe obesity are less likely to have experienced sexual debut, however, sexually active female adolescents may be engaging in higher rates of sexual risk behaviors and this has the potential to impact future reproductive health.

What this study adds

- *Utilizing a controlled observational design*, rates of engagement in romantic and sexual behaviors for females with severe obesity were generally lower than females of healthy weight.
- There was a subgroup (25%) of sexually active females with severe obesity who were exhibiting higher sexual health risks and consequences, and prior to WLS.
- Clinical conversations with the adolescent female patient should extend beyond reproductive health needs (e.g., contraception, unintended pregnancies) to include guidance around navigating romantic and sexual health behaviors that are precursors to these negative outcomes.

Table 1

Demographic Characteristics for Healthy Weight, Severely Obese Comparisons (SOComps) and Weight Loss Surgery (WLS) females.

	Healthy Weight	SOComps	WLS	p ^a
Race				
White	53.4%	55.9%	63.0%	<.001 ^b
Black	41.5%	41.2%	17.6%	
Other	5.1%	2.9%	19.4%	
Age	16.34(1.06)	15.72(1.43)	16.96(1.39)	0.001
BMI	0.20(.65) z-score ^C	46.47(5.82)	50.85(8.25)	0.001
Maltreatment		35%	18%	0.05

Note. Healthy weight sample was obtained from the non-maltreated females from the FADS study.

^aComparisons are made between SOComps and WLS females. P-values are based on a t-test for age, a Wilcoxon Rank-Sum test for BMI due to its non-normal distribution, and Chi-Square tests for percentages.

 $b_{\mbox{Based}}$ on the comparison of White females versus females of other race/ethnicities

 C BMI z-score is standard measurement for adolescents; however, it is misleading at the extreme tails of the BMI distribution. For this reason, we use BMI for adolescent females with severe obesity and BMI z-score for females of HW (1).

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Past Year and Life Time Prevalence Rates of Romantic, Sexual and High Risk Sexual Behavior.

				Past Year	Prevalence R	ates			
	Healthy Weight		SOC	Comps			4	SIV	
	n = 118		u	= 68			ü	= 108	
	%	%	Unadjusted ORs	Adjusted ORs	95% CI	%	Unadjusted ORs	Adjusted ORs	95% CI
Romantic Behaviors									
Gone out on unsupervised dates	77.1	48.5	0.46	0.43 *	0.31 - 0.60	38.9	0.36	0.35 *	0.29 - 0.41
Held hands	83.1	66.2	0.58 *	0.54 *	0.41-0.73	58.3	0.47 $*$	0.45 *	0.34-0.61
Romantic kissing	7.67	60.3	0.56^*	0.49	0.35-0.68	46.3	0.40	0.36	0.37-0.47
Making out	78.8	58.8	0.56^*	0.50^{*}	0.38–0.66	41.7	0.36	0.34 *	0.25-0.47
Sexual Behaviors									
Heavy petting	70.3	45.6	0.52 *	0.46	0.36-0.56	27.8	0.33 *	0.30^{*} , a	0.19 - 0.46
Oral sex	53.4	32.4	0.58 *	0.45 *	0.39-0.52	20.4	0.40	0.35 *	0.26-0.46
Sexual Intercourse	50.8	30.9	0.59 *	0.49	0.42-0.57	16.7	0.37 *	0.33 *	0.23-0.47
Had vaginal and oral sex	41.5	27.9	0.69^*	0.53 *	0.43–0.66	14.8	0.44	0.38 *	0.27-0.52
High Risk Behavior									
One night stand	12.7	11.8	0.95	0.78	0.39 - 1.54	6.5	0.69	0.61	0.35 - 1.06
Sex without contraception	41.5	17.6	0.49^{*}	0.37 *	0.29-0.47	8.3	0.31^{*}	0.25^{*}	0.15 - 0.41
Sex while drunk or high	21.2	10.3	0.63^{*}	0.28 *	0.16-0.49	4.6	0.41	0.22 *	0.07–0.66
				Lifetime I	Prevalence R	ates			
	Healthy Weight		so	Comps			-	NLS	
	%	%	Unadjusted ORs	Adjusted ORs	95% CI	%	Unadjusted ORs	Adjusted ORs	95% CI
Romantic Behaviors									
Gone out on unsupervised dates	81.4	52.9	0.44 *	0.40	0.26 - 0.60	46.3	0.37 *	0.35^{*}	0.28-0.45
Held hands	89.8	72.1	0.50^*	0.44 *	0.28-0.70	62.0	0.38	0.35 *	0.26-0.47

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Lifetime Prevalence Rates

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	Healthy Weight		SQ	Comps			1	NLS	
	%	%	Unadjusted ORs	Adjusted ORs	95% CI	%	Unadjusted ORs	Adjusted ORs	95% CI
Romantic kissing	85.6	66.2	0.52^{*}	0.47 *	0.31-0.72	52.8	0.37 *	0.35*	0.25-0.49
Making out	82.2	61.8	0.54	0.51	0.37-0.69	45.4	0.35 *	0.35 *	0.24-0.49
Sexual Behaviors									
Heavy petting	72.9	47.1	0.51^*	0.42	0.31 - 0.59	33.4	0.35^{*}	0.32	0.18-0.57
Oral sex	60.2	33.8	0.51^*	0.42	0.35-0.50	20.4	0.35^{*}	0.31^{*} , a	0.23-0.43
Sexual Intercourse	59.3	35.3	0.54	0.46	0.42 - 0.50	21.3	0.36	0.32 ^{*, a}	0.22-0.48
Had vaginal and oral sex	50.8	27.9	0.55 *	0.47 $*$	0.38-0.57	16.6	0.37 *	0.34 *	0.25 - 0.48
High Risk Behavior									
One night stand	21.2	20.6	0.98	0.78	0.60 - 1.01	11.1	0.66*	0.57 *	0.38–0.86
Sex without contraception	43.2	17.6	0.47 *	0.35^{*}	0.25 - 0.49	8.3	0.30^{*}	0.24^{*} , a	0.17-0.35
Sex while drunk or high	23.7	13.2	0.67^{*}	0.40	0.27-0.59	6.5	0.45 *	0.32	0.19-0.53

ed any childhood Note. All scores were activationized to retrect U = never engaging in the penavior and 1 = engaged in the benavior. Covariates included age, race and whether the adolescent had t made mather the term of the two severely obese females, BMI was added as an additional covariate.

 \ast significantly different (p<.05) from Healthy Weight.

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 a WLS significantly different (p<.05) from SOComps.

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Table 3

Prevalence Rates, Means and Standard Deviations for Sexual and Sexual Risk Behaviors for Adolescents who Experienced Sexual Debut.

	Healthy Weight		SOComps		WLS
	$\mathbf{n} = 70$		n = 24		n = 23
		M (SD)/%	B(SE)/OR (95% CI)	M (SD)/%	B(SE)/OR (95% CI)
Age at first intercourse	15.06(1.05)	14.48(1.61)	-0.11(0.52)	15.15(1.66)	0.04(0.33)
Years since sexual debut	1.56(1.13)	1.52(1.63)	0.11(0.52)	1.70(1.21)	-0.01(0.32)
Number of partners ^a	2.38(1.18)	2.38(1.25)	-0.03(0.47)	2.04(1.07)	$-0.47(0.13)^{*}$
HIV risk behaviors ^b	2.87(1.86)	2.71(2.14)	-0.59(0.36)	2.78(1.91)	-0.59(0.41)
Birth Control Consistency $^{\mathcal{C}}$	3.77(2.22)	3.96(2.44)	0.43(0.46)	4.86(1.91)	$1.16(0.25)^{*}$
% Condoms during last sexual intercourse	74.3	58.3	0.58(0.29 - 2.51)	69.69	1.09(0.63 - 1.88)
% Hormonal contraception d	65.7	33.3	$0.38(0.18{-}0.79)^{*}$	60.9	0.87(0.58–1.29)
% who have been pregnant	15.7	0	I	13.0	1
% reporting STIs ^e	28.6	0	I	17.4 ^e	

Note. STIs = Sexually Transmitted Infections.

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* significantly different (p < .05) from Healthy Weight. Covariates included age, race and whether the adolescent had experienced any childhood maltreatment in the comparisons of the severely obese females to HW females. In the comparisons of the two severely obese females, BMI was added as an additional covariate.

^aCoded as 0=none; 1=1 partner; 2=2 to 3 partners; 3=4 to 7 partners; 4=8 to10 partners; 5=more than 10 partners.

 $b_{Variable}$ is the sum of 11 items (range 0–11).

c Variables were scored from 1 = I never use birth control to 6 = for sure, every time I have sex I use birth control.

 d WLS significantly different (p<.05) from SOComps.

 $\stackrel{e}{}$ Results of the Fishers Exact Test showed significant difference between WLS and SOComps.

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Table 4

Sources of Information about Birth Control by Weight Status.

		Healthy We	ight			SOComps				MLS	
	No	Yes but not effective	Yes and effective	No	Yes but not effective	Yes and effective	B (SE)	No	Yes but not effective	Yes and effective	B (SE)
Doctor	29.7	10.2	60.2	44.1	8.8	47.1	-0.35(0.19)	28.7	10.2	61.1	0.02(0.24)
Mother	29.7	21.2	49.2	38.2	14.7	47.1	-0.15(0.13)	25.9	18.5	55.6	0.15(0.12)
Learn on own	39.1	20.3	41.5	45.6	16.2	38.2	-0.14(0.20)	32.4	20.4	47.2	0.15(0.16)
Sexual Education	27.1	24.6	48.3	41.2	16.2	42.6	$-0.26(0.06)^{*}$	29.6	30.6	39.8	-0.15(0.08)
Friend	32.2	28.0	39.8	47.1	22.1	30.9	-0.32(0.17)	38.0	25.0	37.0	$-0.11(0.04)^{*}$
Relative	66.1	10.2	23.7	64.7	19.1	16.2	-0.04(0.15)	63.0	9.3	27.8	0.08(0.15)
Sibling	72.0	11.9	16.1	<i>9.77</i>	10.3	11.8	-1.68(0.10)	72.2	5.6	22.2	0.05(0.08)
Boyfriend	69.5	11.0	19.5	75.0	11.8	13.2	-0.18(0.16)	81.5	4.6	13.9	$-0.35(0.04)^{*}$
Father	83.9	6.8	9.3	85.3	8.8	5.9	-0.10(0.12)	86.1	8.3	5.6	-0.14(0.12)
Note.											

* Significantly different (p < .05) from Healthy Weight. Covariates included age, race, and whether the adolescent had experienced any childhood maltreatment.