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Original Article

It is not what you weigh, it is how you present it: body size, attractiveness, physical functioning, and access to partnership and sexuality for older men and women

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Physical attractiveness has been linked to better economic, dyadic, and health outcomes but is understudied. We focus here on the gendered implications of attractiveness for one component of social well-being, access to intimate partnership and sexuality, among older adults. In addition, we examine the role of body size, as measured and rated by an observer, in evaluating attractiveness and the diverging consequences for women and men. We use data from Rounds 1 (2005–2006) and 2 (2010–2011) of the National Social Life, Health, and Aging Project ($N = 2{,}144$) to explore the association of two measures of body size, weight relative to height (body mass index [BMI]) and interviewer assessments of body size, with sexual behavior that requires a partner and sexual behavior that does not. We find that at larger body sizes as reflected in both the BMI and rated body shape, women—but not men—face a lower probability of having a partner and engaging in partnered sex, and a lower frequency of vaginal intercourse and receiving sexual touch. These associations are mediated by physical functioning for the BMI and by attractiveness as rated by the interviewer for rated body shape. We also find that women—but not men—are more likely to report finding sex not pleasurable at a higher BMI, which partly operates through the mechanism of functional limitations. We suggest that these findings reflect different attractiveness standards for men and women, which reduce women's access to partners and partnered sex but not solitary sex, such as masturbation.

Key words: body shape; obesity; marriage; partnership; sexuality; attractiveness; gender; aging.

Introduction

> "*Such a self is not, I would say, primarily the physiological organism . . . The self, as that which can be an object to itself, is essentially a social structure, and it arises in social experience*" (Mead 1934: 139–40).

At least since Mead (1934) and Goffman (1956), social scientists have long been interested in how social interactions—above and beyond physiological organisms or the body—construct the self.

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This raises fundamental questions about how the physical becomes social, how social evaluations of physical characteristics take place, and the conditions under which they matter. Empirically, social science research has extensively studied characteristics that can be both measured and socially perceived or evaluated, such as skin tone (Monk, Esposito, and Lee 2021), attitude toward inequality (Wodtke 2018; Song 2023), occupation prestige (Zhou 2005; Valentino 2021), and physical activity (Huisingh-Scheetz et al. 2021). Yet, less is known about the conditions under which social evaluations of physical characteristics matter. Specifically, we ask how the duality of the measured and socially perceived attributes becomes a gendered source of inequality, with different standards of evaluation for women than for men. We apply such an idea in the case of physical attractiveness in body size as anthropologically measured and socially rated by others.

Physical attractiveness—both as perceived by others and as viewed in oneself—has been linked to access to social, economic, and interpersonal resources and well-being. People rated as physically attractive are viewed as more socially desirable by others (Hakim 2011; Monk et al. 2021), with links between attractiveness and relationship stability and satisfaction (Sangrador and Yela 2000). Perceptions of one's own attractiveness seem to affect romantic partnership and sexuality, with links of negative body image to worse sexual experiences, sexual function, and sexual response (McNabney 2022). Little attention has been paid to socially perceived body shape or to body weight for height as predictors of physical attractiveness, although the distribution of weight in the population has shifted upward (Wang et al. 2020; Yang et al. 2021). We focus here on the links between body size, physical attractiveness, physical functioning, and access to the social goods that flow from intimate relationships, such as the presence of a spouse or intimate partner, and sexuality, including sexual ideation and sexual activity both with a partner and by oneself. This study specifically examines the experiences of older adults, who represent a growing share of the population in the United States and many other countries. We contribute to this broad field of inquiry by showing how the unequal consequences for men and women of the measured and socially evaluated body size reflect gendered social norms and expectations. Since social well-being at older ages, including partnership and sexuality, is an important component of overall well-being and health (Waite, Duvoisin, and Kotwal 2021), understanding the relationship between body weight, attractiveness, and social well-being becomes increasingly important.

Background

Body size and shape

The prevalence of overweight and obesity in the United States has risen substantially since 1999 and is projected to continue to increase, with 74.7 percent of women and 68.9 percent of men overweight or obese (Wang et al. 2020). Large body size—as classified by body weight relative to height in the body mass index (BMI)—brings with it increased risks of chronic illness, functional limitations, and mortality (Preston, Vierboom, and Stokes 2018; Gutin 2021) and decreases in satisfaction with one's own body shape, especially for women (Brierley et al. 2016).

For women, the menopausal transition is often accompanied by weight gain, which contributes to other health risks, including arthritis, mood disorders, cancer, and sexual dysfunction among older women (Kapoor, Collazo-Clavell, and Faubion 2017). Older men who are classified as overweight or obese often present clinically with sexual dysfunction and low energy (Cabler et al. 2010). Thus, living with obesity may pose risks to sexual function among older adults.

Body size and attractiveness

Beauty has been shown to be a potent social stratifier such that those rated as the most physically attractive are also perceived more positively on many unrelated dimensions, such as academic or job performance (Talamas, Mavor, and Perrett 2016; Marquis, Tilcsik, and Zhang 2024), often achieving better outcomes, perhaps as a result (Brierley et al. 2016; Monk et al. 2021). Evolutionary theories point to attractiveness as an indicator of underlying health and fitness to reproduce. Thus, attractiveness plays a fundamental role in mate selection and reproduction (Brierley et al. 2016). Body shape, weight, and body composition are key predictors of ratings of attractiveness but

act somewhat differently for women and men. Studies that ask people to rate the healthiest body shape show the levels of BMI consistent with medical guidelines for both men and women. Ratings of the most attractive body shape for women show the levels of BMI lower than the physiologically healthy range, and for men, levels are in line with a healthy range (Brierley et al. 2016).

Women tend to be less satisfied with their bodies than men and have a less positive body image, even though objective observers rate women as more attractive on average (Feingold and Mazzella 1998). Older women most often see their weight as too high, whereas most older men do not (Bouzas, Bibiloni, and Tur 2019). Some evidence suggests that it is biologically harder for women to maintain slender bodies valorized by gender role attitudes. Women are more likely to be overweight or obese than men, and the gender gap in body weight seems to increase with age (Sayer et al. 2008). This disparity has been linked to differences in hormonal levels, metabolism, and body composition (Cooper et al. 2021).

Ideals of body size and shape, as portrayed in the media, feature thin women and muscular men (Buote et al. 2011), with ideals more flexible for men than for women. Thus, women with large body sizes may experience worse weight stigma across numerous settings compared to men with obesity. The extra body mass carried by those classified as obese may be considered unattractive, particularly if carried on the abdomen, and often is stigmatized socially (Puhl and Heuer 2009). Body shape and appearance will tend to coincide less closely with ideals of beauty as body weight increases (Chen and Brown 2005). Standards of beauty by gender might well spill over to sexual activities (Sanchez and Kiefer 2007; Good and Sanchez 2010).

Functional limitations

Physical functioning tends to decline with age, as shown by the share of the population with some functional limitations, such as difficulty walking a distance or climbing stairs, which increases dramatically with age (Covinsky et al. 2009). High body weight increases the risk of functional limitations (Himes 2000).

Large body size may also affect sexuality through its effect on physical functioning (Sarwer et al. 2018). Large volumes of fat tissue have negative effects on hormones that contribute to sexual behavior, including erectile function and vaginal lubrication (Netjasov et al. 2016). Adipose tissue directly affects sexual response and increases the risk of comorbidities, which then affect sexual desire and functioning (Rowland, McNabney, and Mann 2017). Some researchers suggest that limitations in physical functioning associated with extreme obesity could cause sex with a partner to be unpleasant, difficult, painful, or out of the question (Sarwer et al. 2018). This includes sexual intercourse, oral sex, and sexual touching.

Partnership

Finding and keeping a mate in an intimate partnership is one of the key developmental tasks of adulthood (Kaufman 2019), and a successful partnership—some argue—lead to better outcomes for both members of the dyad across many dimensions of health (Waite and Gallagher 2001; Liu and Waite 2014), including mortality (Kulu, Mikolai, and Franke 2024). One of the benefits—especially at older ages—is partnered sex. Among the cohorts now at older ages, sex very rarely occurs outside marriage, cohabitation, or an established nonresidential partnership (Waite et al. 2009). Partnership is much less available for older women, who are much more likely than men to become widowed, and less likely to re-partner following divorce or widowhood (Brown et al. 2019). Brown, Lin, Hammersmith and Wright (2019) also show that both older men and older women who do not re-partner have worse health as measured by the number of chronic conditions than either those who remarry or those who cohabit. The market for partners among those single at older ages is much better for men than for women, as higher mortality for men means there are more single women per (surviving) single man, and older men tend to partner with younger women, whereas women do not often partner with younger men. Thus, the pool of partners expands with age for men and shrinks with age for women (Lichter, Qian, and Song 2022). We note that none

of the literature on partnering among older adults takes into account having an intimate partner with whom one does not live, which we incorporate in this study.

Sexuality

Many older adults express interest in sex and remain sexually active (Lindau et al. 2007), and among those who remain sexually active, emotional and physical satisfaction with sex is high (Waite et al. 2009). Sexual health among partnered older adults is associated with higher subjective well-being (Lee et al. 2016), and remaining sexually active seems to help older couples to weather the inevitable health challenges that occur with aging to prevent declines in relationship quality (Galinsky and Waite 2014). Partnered sexual activity is also linked to better physical health outcomes (Lindau et al. 2007). Given the centrality of sex as both a social and a health behavior, it is important that we understand the processes through which some people have greater access to these benefits and some have less.

Sexual ideation—defined as thinking about sex—is an individual sexual experience that is available to all older adults, regardless of their relationship status. The same is true of masturbation. Partnered sex at these ages is available to those with a spouse, cohabiting partner, or romantic partner and relatively unavailable to those without (Waite et al. 2009). Having partnered sex depends on the physical characteristics of each of the partners, such as physical functioning and comorbidities, their interest in sex, capacity, and behavior, as well as on the characteristics of the partnership (Waite et al. 2017). Sexual motivation has been shown to be stronger for men than for women (Galinsky, McClintock, and Waite 2014), and the physical health of the male partner has been found to be much more consequential for the sexual activity of a couple than the health of the female partner (Karraker, DeLamater, and Schwartz 2011).

Body size, attractiveness, and sexuality: gender conformity theory

We argue that body size may affect sexuality among older adults, at least in part, through norms about attractiveness. Large body size may lower self-esteem and trigger social stigma (Brewis 2014), reducing the chances that those with obesity have a spouse, cohabitant, or romantic partner. Partnered older adults who are very heavy may feel unattractive (Puhl and Heuer 2009), so worries about their physical appearance may lead them to avoid sex. However, the individual sexual experience of masturbation or sexual ideation may not be adversely affected.

We apply *gender conformity theory* to guide our analysis of how large body size affects sexuality differently for older men and women. Gender is conceptualized in the context of routine social interactions as perceptual and interactional attributes of men and women who express their masculinity and femininity through gender role-conforming behaviors, beliefs, and appearances to foster social approval (Charles and Bradley 2009). Deviation from prescribed gender roles may trigger backlash, shaming, and social stigma (Rudman and Fairchild 2004). These social interactions reinforce gender role conformity and inflict social costs for deviation (Sanchez and Crocker 2005). Gender role conformity in social interactions has been found to positively affect life satisfaction and self-esteem (Good and Sanchez 2010).

These comparisons to ideals are more problematic for women than for men, as women are at greater risk of weight gain with menopause, a greater share of women than men have a BMI of 30 or more, and standards of attractiveness seem to be more flexible about weight for men than for women (Olson et al. 2020).

Body size, body shape, and sexuality of the older adults: interactive biopsychosocial model

We build upon the interactive biopsychosocial model (IBM) to guide our analysis of the association of body size, body shape, attractiveness, and physical functioning with sexuality in older men and women (Lindau et al. 2003; Galinsky et al. 2014). IBM extends the neuroendocrine perspective on biological factors that affect sexuality during development (Beach 1976) and focuses on the interrelated biophysical processes that lead to adult sexuality. Among men with obesity,

the accumulation of adipose tissue could affect the biological process of steroid aromatization, leading to androgen deficiency and erectile dysfunction (Cabler et al. 2010). Women with obesity may experience changes in sex hormone-binding globulin and estrogen levels that affect sexual functioning (Netjasov et al. 2016). High body weight for height is also associated with other physiological comorbidities that may affect sexual functioning, including type 2 diabetes, hypertension, physical functioning, urinary incontinence, and menopause (Sarwer et al. 2018).

IBM conceptualizes sexuality as constructed within the social environment in which the individual or sexual dyad is situated (Galinsky et al. 2014). This includes the cultural norms of society, in this case, the United States, for body size and shape. To the extent to which social norms stigmatize large body sizes, these norms disadvantage larger people in the search for a partner and the quality of any match. Studies show that men and women with obesity are less likely to date, less selective of potential partners compared to those of average weight (Glasser, Robnett, and Feliciano 2009), and less satisfied with their partner as a lover (Côté and Bégin 2020).

Ideals of body size and shape also seem to be fairly stringent for women and more heterogeneous and flexible for men (Olson et al. 2020), with slender as ideal for women and larger and muscular as physically and sexually attractive for men (Chen and Brown 2005; Buote et al. 2011). There is also a moral component to ideals of weight and body size, with fat blaming and fat shaming common (Brewis 2014). Hence, psychologically stigmatizing beliefs in the wider social environment and potential romantic relationships may spill over to sexual relationships.

We conceptualize the process by which body size affects partnership and sexuality in older adults with attractiveness and functional limitations as mediators. We consider body size as measured by the BMI using a scale and a tape measure, and body shape as rated by an objective observer, the field interviewer, who carried out the in-person interview (Riley, Waite, and Cagney 2021). We argue that interviewer-rated body shape—scored from thin to obese—may be more reflective of the social evaluation of weight, whereas body weight for height—as measured by the BMI—captures both the functional and social consequences of obesity. This allows us to assess the different pathways through which weight may affect access to partnership and solitary versus partnered sexual activities and may do so differently for men and women.

Using the National Social Life, Health, and Aging Project (NSHAP)—a nationally representative survey of community-dwelling older adults—we assess the associations of two measures of body size with partnership and sexuality. This includes sexual behaviors that require a partner, specifically partnered sex, vaginal intercourse, sexual touching, and oral sex, and those that do not, including sexual ideation and masturbation. We argue that partnered sexual activities may be affected by the social framing of body size, and by physiological consequences of body size that might affect physical and sexual function, whereas solitary sexuality should be affected less or not at all by social attitudes about body size. To the extent that gender disparities exist, they may provide evidence of the burden of large body size on the social well-being of older women versus older men.

Hypotheses

We hypothesize that body size and body shape affect sexuality differently for interactions that include a partner from those that do not. We argue that this is because attitudes, sexual scripts, fat shaming, and the social stigma that faces those with large bodies come into play much less when there is no other person or social group involved. Large people can think about sex without this negative framing and can masturbate without negotiating with another person.

Hypothesis 1: High body weight for height (BMI) is not associated with solitary sexual activities but is negatively associated with partnership and partnered sex. Interviewer-rated body shape shows the same pattern.

In addition, we hypothesize that the link between body size and sexuality is less negative for men than for women. Sex-dimorphous ideals of body size and shape that privilege slender women and large, muscular men may make sexuality more available to men than women of the same

body size (Feingold and Mazzella 1998; Buote et al. 2011). While physical body shape seen as attractive significantly enhances women's sexual capital and desirability, for men, attributes such as strength and resources are more pivotal (Hakim 2011).

Hypothesis 2: The negative association of large body size with access to partnership and partnered sex is greater for women than for men.

Finally, we hypothesize that functional limitations and the perception of attractiveness act as mediators in the relationship between body size, body shape, and sexuality, with attractiveness influencing access to sexual partners and functional limitations affecting the physical capability to engage in sexual activities. Obesity and larger body sizes are associated with several physiological comorbidities, such as hormonal imbalances and sexual functioning (Cabler et al. 2010; Netjasov et al. 2016). Functional limitations resulting from large body size can make sexual activities difficult, painful, or even unfeasible (Rowland et al. 2017; Sarwer et al. 2018). In addition, large body sizes and obese body shapes may diminish an individual's attractiveness, both self-assessed and perceived by others, influencing their ability to form and maintain intimate relationships (Côté and Bégin 2020). To the extent to which these *social factors* play a large role in partnered sexuality, we expect to see gender differences in sexual outcomes. To the extent to which *physiological mechanisms* underlie the association between sexuality and weight, we expect to see few or no differences between men and women.

Hypothesis 3: The links of body shape with partnership and partnered sexual activity are mediated in part by functional limitations and attractiveness.

Materials and methods

Sample

Our data come from the NSHAP, a nationally representative prospective cohort survey of community-dwelling American older adults aged 57–85 during the baseline Round 1 (R1) in 2005–2006. The study achieved a weighted response rate of 75.5 percent in R1 (O'Muircheartaigh, Eckman, and Smith 2009). The co-resident partners of respondents in R1 were added in Round 2 (R2) (2010–2011), and a refresher Baby Boomer cohort of people aged 50 or above was recruited in Round 3 (R3) (2015–2016).

We use the longitudinal sample of R1 and R2[1], with two measures of body size, weight relative to height (BMI) and interviewer assessments of body size, in R1 (2005–2006) and partnership and sexuality data from R2 (2010–2011) ($n = 2{,}261$), which has a wide variety of measures of sexual behavior and sexual ideation. The longitudinal sample of NSHAP R1 and R2 that we use includes one respondent per household as their co-resident partners were only included starting from R2. This assuages concerns about intra-household correlations in sexuality. We removed respondents without valid measures of race or ethnicity in any wave ($n = 20$)[2].

Selectivity. To account for attrition from R1 to R2, we multiply the R1 survey weights that cross-sectionally account for both the inverse probability of selection and the likelihood of nonresponses by inverse probability weights of retention over time to our sample (Supplementary Appendix A). All descriptive results and regression analyses presented below are adjusted for such weight and complex survey design.

Body size

One of the most commonly used anthropometric measures of weight relative to height is the BMI (Preston et al. 2018). During the biomeasure component of NSHAP, interviewers used a bathroom scale to measure the weight of the respondent and a tape measure to assess height (O'Doherty et al. 2014). The analytic sample includes all respondents ($N = 2{,}144$) with valid height and weight measures, and across the NSHAP waves, the BMI remains very stable (Supplementary Appendix A). The BMI is calculated based on weight and height using the standard formula (kg/m^2).

Critics have pointed to the relative coarseness of the BMI as a biomarker for obesity and, thus, overall health (Rothman 2008). However, Gutin (2018) argued that although much research neglects to acknowledge the heavy social framing around BMI, this measure can be used in a holistic assessment of weight and health. We use it here as an indicator of measured body size.

To complement our results based on the BMI, we also used a subjective assessment of body shape made by the field interviewer. NSHAP data include interviewer assessment of respondents' characteristics (Riley et al. 2021). Specifically, NSHAP interviewers were asked to describe the body shape of the respondents using a scale of 1 (thin) to 5 (obese). Their assessments reflect attributes that are not fully captured by the weight for height BMI and reflect how respondents are perceived by others.

Sexual ideation, partnership, and activities

NSHAP defined *sexual activity* as a mutually voluntary activity with a partner involving sexual contact, regardless of whether intercourse or orgasm occurs (Waite et al. 2009). We begin our analysis with sexual ideation and masturbation in NSHAP R2. These individual sexual experiences are theoretically available to everyone. First, we studied the NSHAP respondents' frequency of *sexual ideation* regardless of whether they have a partner. This was based on the question "how often do you think about sex," on an ordinal scale ranging from never (volunteered) to several times a day. Next, we assessed the links between body size and the frequency of solitary sexual activity, *masturbation*, defined as stimulating one's own sex organs for sexual pleasure, not with a sexual partner. The respondents were asked the frequency of masturbation, on average, in the past 12 months on an ordinal scale ranging from not at all this year to more than once a day. Our results remain robust if the variable is dichotomized into a binary measure of whether one had *any* masturbation in the past year.

We then focused on partnership and partnered sexual activities (Waite et al. 2009; Zhang and Liu 2020). We assess the links between body weight and shape and whether a respondent is *married, cohabiting,* or *has a romantic, intimate, or sexual partner* (1 = yes, 0 = no). Our sample includes 1,226 married, 45 cohabiting, and 93 respondents who reported a romantic, intimate, or sexual partner with whom they did not live. These categories are mutually exclusive. Then, we studied whether the person was *sexually active in the last 3 months*. This was based on the question asking whether the respondent had sex (1 = yes, 0 = no). We also analyzed reports of trouble with sexual gratification. Respondents were asked, during the last 12 months, whether there has ever been a period of several months or more when you *did not find sex pleasurable* (1 = yes, 0 = no). Finally, we focused on *receipt of any oral sex* in the last 12 months and the frequency with which they reported having *vaginal intercourse* and receiving *sexual touch* on genitals with hands in the last 12 months on an ordinal scale ranging from always to never. Among those who have never had these three intimate sexual activities in the last 12 months, following precedent studies, we included both those who are sexually inactive and others who are sexually active but did not undertake them (Liu, Shen, and Hsieh 2019).

Mediators: attractiveness and functional limitations

Following our conceptual framework, we separately test for mediation of the association of body size with partnership and sexuality by functional limitations and attractiveness, which are assumed to be causally independent such that each mediator operates independently in its pathway from the exposure (body size and shape) to the outcome (partnership and sexuality). Limitations in physical functioning are measured by the number of limitations in activities of daily living (ADLs) (Huisingh-Scheetz et al. 2014). We measure attractiveness on a scale based on questions that asked the field interviewer to describe the personal attributes of the respondent on a scale of 1 (attractive) to 5 (unattractive) in the following domains: physical attractiveness, personality, attire, hygiene, posture, and stomach shape, respectively (see Riley et al. 2021, for details). We summed and then averaged the responses on these six indicators to create a score of an individual's attractiveness as rated by an outside observer (Cronbach's $\alpha = .80$). We reverse-coded the rating so that higher scores indicate higher attractiveness (range: 1–5).

Demographic covariates

Partnership, sexuality, and social behaviors differ markedly between demographic groups, so it is important to adjust for basic demographic characteristics related to both body weight and the sexual outcomes in question. Age is coded in years, and gender is coded as 1 = men, 0 = women. Race and ethnicity are coded as a four-level categorical variable: *White/Caucasian, Black/African American, Hispanic non-Black, and Other*. Education is recoded based on degree attainment into a series of dummy variables: *Less than High School, High School Degree or Equivalent, Vocational Certificate or Some College, and Bachelor's or higher*. The *High School Degree or Equivalent* category is omitted as the reference category in analyses.

Since we are interested in the total effect of body weight on partnership and sexuality alongside the gender differences in the effect, we avoid overcontrolling the mediators. Further, we avoid including mediators that may be affected by partnership and sexuality and thus are colliders. For example, while R1 body weight might affect self-rated health, depression, or marital satisfaction in R2, these outcomes could also affect and be affected by partnership status and sexual activities. In this case, we may introduce bias in the associations of interest between body weight and sexuality as these measures are colliders in our study. We address these concerns by testing for the mediating role of functional limitations and attractiveness.

Data analysis

We began with descriptive statistics on demographic characteristics of older adults in the analytic sample by gender, including age, race/ethnicity, education, BMI, and interviewer ratings of body shape. We examined the differences in the distribution of these characteristics by gender using the *t*-test and Wald test of independence for continuous and categorical variables, respectively.

Then, to isolate the social framing of obesity from the functional dimension, we concurrently include the interviewer's assessment of body shape, from thin to obese, in the regression. Our results remain substantively the same when we assess the influence of the two measures, the BMI and interviewer-rated body shape, on partnership and sexuality in separate model specifications (Supplementary Appendices B and C).

We use multivariate binary and proportional odds ordinal logistic regressions to model the R2 sexual ideation, partnership status, and sexual activity by R1 BMI fitted with restricted cubic splines (Harrell 2015, Supplementary Appendix A) and R1 interviewer-rated body shape. By incorporating the use of body shape measurements from 5 years prior to the collection of data on sexual ideation, partnership status, and sexual activity, we explicitly aimed to clarify the direction of causality and mitigate concerns regarding reverse causality. Preliminary analysis using cross-sectional data in R2 and the longitudinal analysis using the cross-lagged panel model show minimal difference in the substantive findings.

Following the estimation process, Wald tests were conducted to evaluate the presence of the associations. With the same specification, the estimation is repeated for each individual sexuality measure alongside partnership status, controlling for age, sex, race/ethnicity, and education. Including the quadratic term of age has minimal impact on the results. Because we are interested in the heterogeneous influence of body weight on outcomes by gender, we also included an interaction term between the BMI or the interviewer's assessment of body shape and gender in separate specifications. Subsequently, we generated the plot of our findings. This approach was crucial as coefficients from spline regression lack direct interpretability, and conveying insights through graphical means is important. The visualized plots are presented as the predicted probabilities associated with the binary outcome and predicted mean of the ordinal outcome on its original scale by summing all values of the ordinal outcome multiplied by the estimated probabilities that the outcome equals that given value (see Hannah and Quigley 1996, for details).

Finally, we test our conceptual framework to estimate the direct effect of body weight or interviewer-rated body shape on partnership and sexuality and the indirect effect that is mediated by the scale of attractiveness and number of functional limitations implemented with regression

Table 1. Weighted descriptive statistics of demographic characteristics, by gender.

Characteristic	Men, $N = 1{,}028$	Women, $N = 1{,}116$	P value[a]
Body mass index Round 1, mean (SD)	29.446 (5.422)	29.365 (6.532)	0.8
Interviewer-rated body shape Round 1, mean (SD)	2.941 (1.278)	2.821 (1.177)	0.06
Age, years, mean (SD)	72.010 (7.310)	72.568 (7.277)	0.14
Race and ethnicity (percent)			0.3
White	82%	81%	
Black	8%	10%	
Hispanic, non-Black	7%	6%	
Other	3%	2%	
Education (percent)			<.001
High school or less	23%	28%	
High school graduate	34%	20%	
Some college	15%	16%	
Bachelors or more	28%	36%	

[a]t-Test adapted to complex survey samples; Wald test of independence for complex survey samples.

imputation (Zhou and Yamamoto 2023). In Supplementary Appendix A, we define the estimands and the steps of estimating the model with regression imputation that avoids functional specification for the mediators (i.e., attractiveness and the number of functional limitations). The confidence intervals and the P-values associated with the estimands are estimated based on 2,000 stratified cluster bootstrap samples to account for the complex survey design of the sample (Rao and Wu 1988). Similar to the multivariate regression analysis, we jointly included the BMI and interviewer-rated body shape in one regression to capture the functional and social components of body size, respectively. We show the estimates that compare the body weight of those respondents with the BMI or body shape at the 75th percentile (BMI: 32.56, interviewer-rated body shape: 4) to those of respondents with body size or shape at the 25th percentile (BMI: 25.25, interviewer-rated body shape: 2), following precedent studies using mediation analysis (Wodtke, Ramaj, and Schachner 2022). All analyses were performed using the R statistical software 4.1.1 (R Core Team 2021).

Results

Descriptive statistics

Weighted descriptive statistics of the analytic sample are presented by gender in Table 1. There is no statistically significant difference between men and women in terms of demographic characteristics, including age, race, and ethnicity. There are, however, gender differences in education. A smaller percentage of women than men received bachelor's or advanced degrees. The average BMI for both men and women is 29.4 ($P = .8$). For the interviewer-rated body shape (1–5), men are rated as 2.94, and women are rated as 2.82, on average, with no statistically significant difference ($P = .06$).

Sexual ideation and masturbation

We use proportional odds ordinal logistic regression with restricted cubic splines to examine the extent to which R1 body weight and interviewer-rated body shape are associated with interest in sex five years later in R2 and whether this differs for men and women. We include both the BMI and interviewer-rated body shape in all models to assess the separate effects. We find that for both older men and older women, R1 BMI is positively associated with the predicted mean frequency of thinking about sex in R2, controlling for R1 interviewer-rated body shape and other demographic characteristics ($P = .009$). We show in figure 1A that the rates of change in the association across

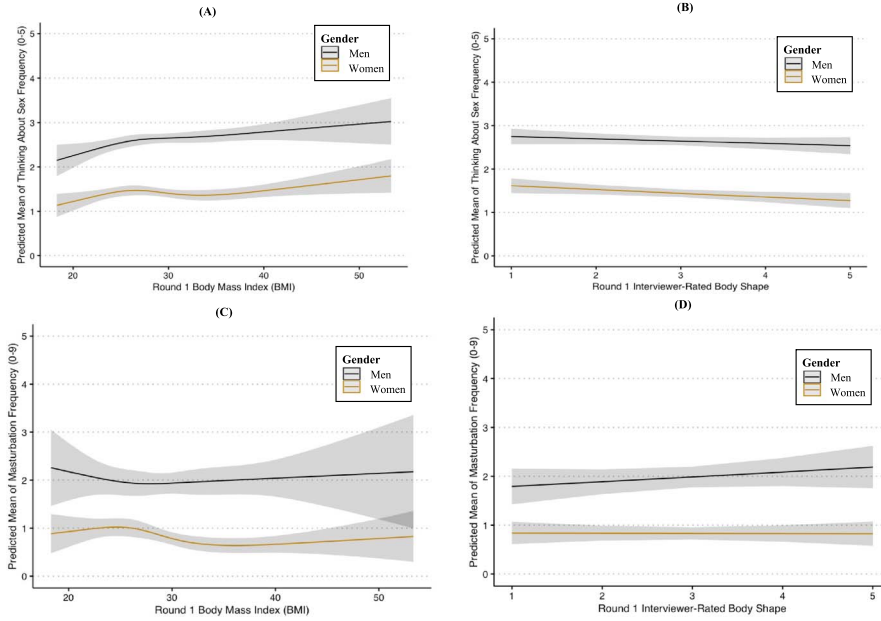

Figure 1. The predicted mean frequency of solitary sexuality in R2 by the BMI/interviewer-rated body shape in R1 for women and men. (A) The predicted mean of thinking about sex frequency in R2 by BMI in R1 for women and men. (B) The predicted mean of thinking about sex frequency in R2 by interviewer-rated body shape in R1 for women and men. (C) The predicted mean of masturbation frequency in R2 by BMI in R1 for women and men. (D) The predicted mean of masturbation frequency in R2 by interviewer-rated body shape in R1 for women and men.

the range of R1 BMI do not differ by gender ($P = .163$). We find a negative association between body shape rated by the interviewer and the frequency of thinking about sex ($P = .032$), but the interaction term between body shape and gender shows a lack of significant difference between men and women in the association ($P = .372$). In figure 1B, we also visualize the estimates and trends in the association between the frequency of thinking about sex and interviewer-rated body shape.

We find a different pattern for masturbation; neither R1 BMI ($P = .415$) nor R1 interviewer-rated body shape ($P = .483$) is a statistically significant predictor of this solitary sexual activity 5 years later in R2. Further, the influence of the BMI ($P = .063$) or interviewer-rated obesity ($P = .284$) on the predicted mean frequency of masturbation does not differ between older men and women. Visually, we show the gender differences in the level of predicted mean frequency of masturbation by gender throughout the range of the BMI and body shape ratings (fig. 1C and D). This result suggests that body weight does affect sexual ideation but not solitary sexual activity, and both associations are similar for men and women. This provides some support for the argument that gendered psychosocial pressure to conform to the ideal body shape is absent in sex without a partner.

Partnership and partnered sexual activity

Next, we present the results for the influence of body size and body shape on partnership and partnered sexual activity five years later for men and women. As shown in figure 2A, we show the results from the binary logistic regressions with interviewer-rated body shape and the BMI fitted as splines. R1 BMI has no overall effect on the probability of having a partner in R2, controlling for R1 interviewer-rated body shape ($P = .134$). However, we see striking differences by gender, with

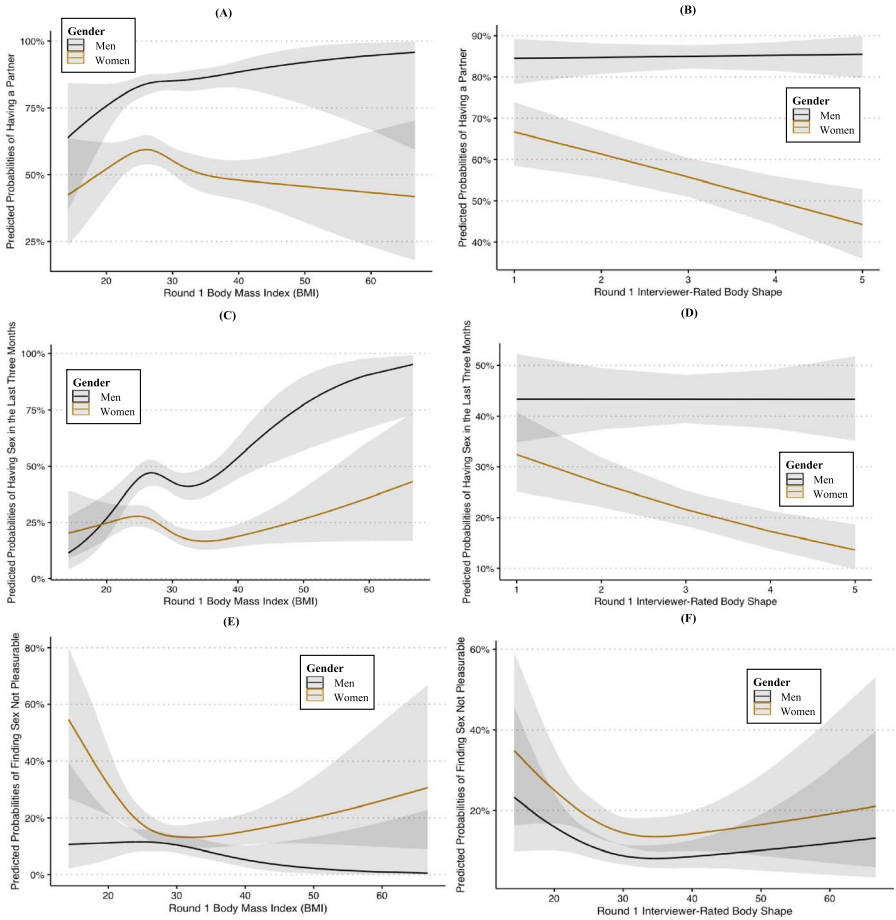

Figure 2. The predicted probabilities of access to partnership and partnered sex in R2 by the BMI/interviewer-rated body shape in R1 for women and men (A) The predicted probabilities of having a partner in R2 by BMI in R1 for women and men. (B) The predicted probabilities of having a partner in R2 by interviewer-rated body shape in R1 for women and men. (C) The predicted probabilities of having had sex in the last 3 months in R2 by BMI in R1 for women and men. (D) The predicted probabilities of having had sex in the last 3 months in R2 by interviewer-rated body shape in R1 for women and men. (E) The predicted probabilities of finding sex not pleasurable in R2 by BMI in R1 for women and men. (F) The predicted probabilities of finding sex not pleasurable in R2 by interviewer-rated body shape in R1 for women and men

the gender gap diverging significantly as the BMI increases ($P = .009$). In contrast, figure 2B shows that every unit increase in rated body shape significantly lowered the odds of having a marital, romantic, or intimate partner in R2 ($P = .032$). This association is stronger for women than men and significantly diverges at higher levels of interviewer-rated body size ($P = .006$). Older men have high predicted probabilities of having a partner throughout the range of the interviewers' ratings on body shape, even more so at very high levels, whereas, for older women, we see these predicted probabilities decrease substantially (see fig. 2B).

Furthermore, we show that, after controlling for the BMI, those rated more obese in body shape by the interviewers have lower odds of being sexually active 5 years later ($P = .040$), and the associations are statistically significant at the 5 percent confidence level. By contrast, we find a statistically significant positive association between the BMI and having had sex with a partner in the last 3 months in R2 ($P = .002$). Further, for both measured ($P < .001$) and interviewer-rated obesity ($P = .001$), we find gender differences in the rate of change in the probability of having had

sex as body weight for height increases. We visualize the gender divergence in figure 2C and D. As the BMI increases, the predicted probability of having any sex in the last 3 months increases for men but remains relatively stable for women. By contrast, the predicted probability of having sex decreases with R1 interviewer-rated body shape for women but remains relatively constant for men. Both measures of body weight tell the same story—women suffer more disadvantage in access to sex at higher weights than men do, with increasing disadvantage at higher weights. Then, we show that the BMI is associated with the quality of the sexual activities using reports of having a period of several months or more when sex was not pleasurable. We find that this outcome is significantly associated with the BMI ($P = .004$), and the rates of change in the association across the range of the BMI differ significantly by gender ($P = .044$). We visualize the pattern as the probability of finding sex not pleasurable (fig. 2E), which decreases until a BMI of around 27 and then increases for women but not for men. That is, a higher BMI (in the range of BMI > 30) is associated with less pleasurable sex, but only for women. The gender divergence is statistically significant at the 5 percent confidence interval ($P = .047$). However, we do find a significant association between body shape as rated by the interviewer and reports of finding sex not pleasurable ($P = .874$), and the interaction term between body shape and gender also remains suggestive ($P = .054$). The lack of association and gender differences for rated body shape are visualized in figure 2F. These results highlight the differences between the two measures, interviewer-rated body shape and the BMI, in reflecting the social and functional components of weight (Hypothesis 2).

Finally, we focus on specific sexual activities. We first show the influence of body weight on one of the most common sexual activities, vaginal intercourse, 5 years later. As shown in figure 3A, we illustrate the significant negative association ($P < .001$) between the BMI and the probabilities of having vaginal intercourse, which differs by gender, with women experiencing faster rates of decline than men as the BMI increases ($P = .019$). As the rated body shape rating increases toward obesity, we also find evidence that older women experience greater reductions in the probabilities of having vaginal intercourse than do older men ($P = .0499$) (fig. 3B).

We then present the results for the influence of body weight on measures of other sexual activities. We find that neither the BMI ($P = .182$) nor interviewer-rated obesity ($P = .110$) is significantly associated with the probability of receiving oral sex. However, we found that the main effects are masked by gender. As the BMI or rated body shape increases, men have significantly higher probabilities of receiving any oral sex 5 years later, while women' probabilities steadily decline (fig. 3C and D). The drastic gender disparities are significantly larger at higher levels of BMI ($P < .001$) and interviewer-rated body shape ($P < .001$). On the other hand, the frequency of sexual touch is statistically significantly associated with the BMI ($P = .027$). As shown in figure 3E, we show that the predicted mean frequency of receiving sexual touch is lower for women with a higher BMI but relatively steady for men across the range of the BMI. The gender disparity in the rate of change in the BMI is statistically significant ($P < .001$). We found suggestive evidence of the negative association between rated body shape and frequency of sexual touch, controlling for the BMI ($P = .504$). As with the results from the BMI, we illustrate in figure 3F that women—but not men—face a significant decline in the predicted mean frequency of receiving sexual touch by interviewer-rated obesity ($P < .001$).

Social and functional mechanisms

As shown in Table 2, we show the estimates from mediation analysis between body weight and sexuality by the number of functional limitations in ADLs. We found statistically significant mediating effects of ADL limitations in how rated body shape affects sexual activities. Rated body shape is associated with the probability of finding sex not pleasurable, at least in part, through functional limitations. Substantively, the coefficients show that if respondents had large body shape and then subsequently experienced the number of functional limitations that they would have experienced at that weight rather than those that they would have experienced with slim

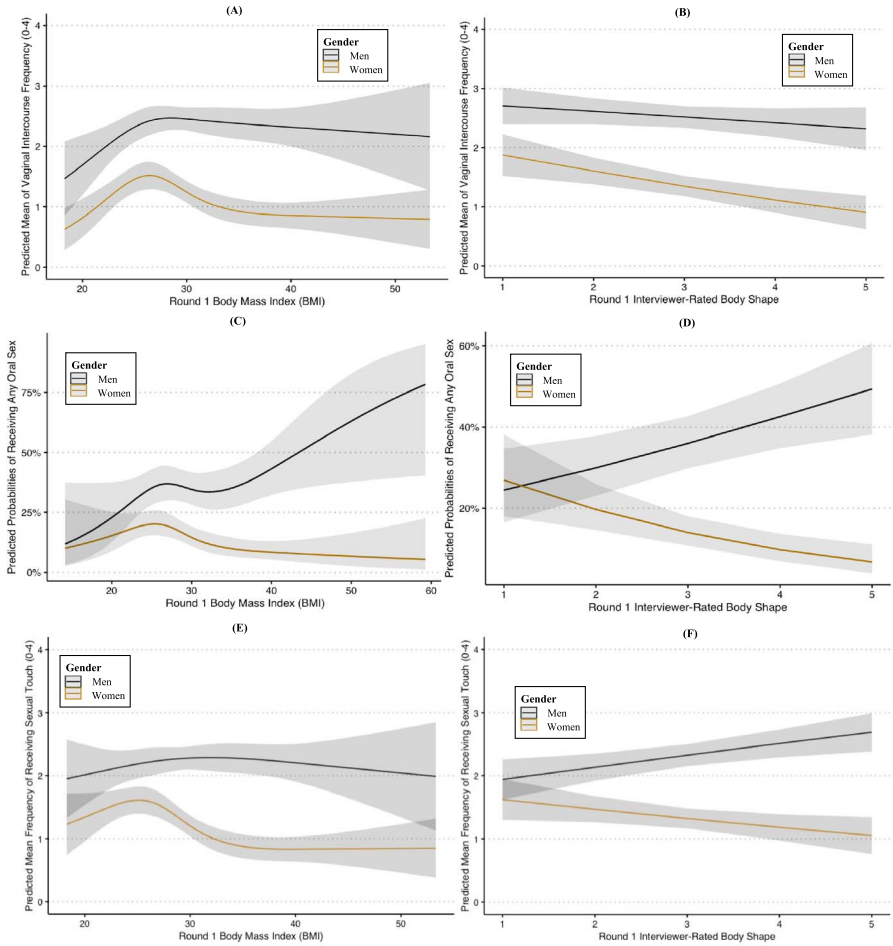

Figure 3. The predicted probabilities of intimate partnered sexual activities in R2 by the BMI/interviewer-rated body shape in R1 for women and men. (A) The predicted mean frequency of vaginal intercourse in R2 by BMI in R1 for women and men. (B) The predicted mean frequency of vaginal intercourse in R2 by interviewer-rated body shape in R1 for women and men. (C) The predicted probability of received oral sex in R2 by BMI in R1 for women and men. (D) The predicted probability of received oral sex in R2 by interviewer-rated body shape in R1 for women and men. (E) The predicted mean frequency of receiving sexual touch in R2 by BMI in R1 for women and men. (F) The predicted mean frequency of receiving sexual touch in R2 by interviewer-rated body shape in R1 for women and men.

body shapes, their odds of finding sex not pleasurable would increase (OR = 1.056, 95 percent CI: [1.015, 1.098]). We also find suggestive evidence that the effect of rated body shape on the odds of having had any sex in the last 3 months operates, in part, through the number of functional limitations (OR = 0.979, CI: [0.961, 1.003]). As shown in Table 3, we show that such an indirect effect is only statistically significant among men, but not women. We found no indirect effect through functional limitations for the influence of body weight on the likelihood of having a partner, of having vaginal sex, sexual touch, oral sex, or on solitary sexual ideation or masturbation. Thus, the effects of body weight on partnership and sexuality appear to work through functional limitations only in the case of lack of pleasure from sex and, potentially, being sexually active with a partner.

Table 2. Results from mediation analysis of body size on solitary sex, partnership, and sexual activities by the number of functional limitations.

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
BMI																
Total effect	1.02	[0.95, 1.091]	**0.922***	**[0.853, 0.986]**	0.979	[0.914, 1.047]	**0.931***	**[0.878, 0.99]**	0.951	[0.888, 1.035]	0.992	[0.922, 1.063]	0.992	[0.888, 1.101]	0.997	[0.916, 1.077]
Direct effect	1.017	[0.952, 1.092]	0.94+	[0.873, 1.004]	0.978	[0.91, 1.046]	**0.943***	**[0.894, 0.995]**	0.951	[0.885, 1.02]	0.992	[0.922, 1.065]	0.969	[0.875, 1.07]	0.974	[0.9, 1.05]
Indirect effect	1.002	[0.979, 1.027]	0.981	[0.955, 1.005]	1.001	[0.972, 1.031]	0.988	[0.967, 1.015]	1	[0.981, 1.035]	1	[0.974, 1.025]	1.023	[0.983, 1.06]	1.024	[0.993, 1.054]
Interviewer-rated body shape																
Total effect	0.93+	[0.872, 1.003]	1.002	[0.945, 1.072]	0.949	[0.892, 1.017]	0.961	[0.9, 1.024]	1.008	[0.931, 1.095]	0.988	[0.926, 1.055]	0.994	[0.932, 1.084]	1.019	[0.959, 1.083]
Direct effect	0.946	[0.874, 1.034]	1.017	[0.949, 1.099]	0.958	[0.9, 1.027]	0.982	[0.913, 1.045]	0.955	[0.893, 1.023]	1	[0.932, 1.071]	0.992	[0.925, 1.075]	1.022	[0.96, 1.088]
Indirect effect	0.983	[0.959, 1.015]	0.985	[0.958, 1.016]	0.99	[0.966, 1.018]	0.979+	[0.961, 1.003]	**1.056****	**[1.015, 1.098]**	0.988	[0.961, 1.02]	1.003	[0.98, 1.042]	0.997	[0.972, 1.023]

Note: +$P < .1$, *$P < .05$, **$P < .01$, ***$P < .001$. Total effect, indirect effect, and direct effect in the mediation analysis compute the interquartile differences between the 25th (BMI: 25.25, interviewer-rated body shape: 2) and 75th percentile (BMI: 32.56, interviewer-rated body shape: 4) of obesity on sexuality. The 95 percent CI means the confidence intervals estimated based on the [2.5, 97.5] percentiles of 2,000 stratified cluster bootstrap samples. The coefficients statistically significant at 5% level of confidence are in boldface values and underlined. Four of the outcomes measures—the frequency of thinking about sex, the frequency of masturbation, the frequency of performing vaginal intercourse, and the frequency of receiving sexual touch in the last 12 months—were dichotomized in the mediation analysis. For solitary sexuality, we distinguish those respondents who responded never or less than once a month think about sex from those responded one to a few times a month or more and distinguish those who had any masturbation in the last 12 months to those who do not. For partnered sexual activities, we distinguish those respondents who responded usually or always had vaginal intercourse and receiving sexual touch from those responded never, rarely, or sometimes.

Table 3. Results from mediation analysis of body size on solitary sex, partnership, and sexual activities by the number of functional limitations, stratified by gender.

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
Men																
BMI																
Total effect	1.072	[0.978, 1.157]	0.934	[0.832, 1.034]	1.003	[0.918, 1.092]	0.947	[0.849, 1.044]	0.929	[0.827, 1.039]	1.004	[0.913, 1.096]	0.908	[0.776, 1.053]	1.009	[0.887, 1.136]
Direct effect	1.076	[0.985, 1.163]	0.956	[0.853, 1.06]	1.021	[0.931, 1.11]	0.974	[0.881, 1.065]	0.926	[0.81, 1.039]	1.011	[0.913, 1.113]	0.925	[0.784, 1.074]	0.993	[0.878, 1.114]
Indirect effect	0.997	[0.968, 1.018]	0.977	[0.942, 1.008]	0.982	[0.947, 1.016]	0.973+	[0.942, 1.001]	1.003	[0.972, 1.047]	0.993	[0.96, 1.024]	0.982	[0.959, 1.015]	1.016	[0.981, 1.05]
Interviewer-rated body shape																
Total effect	**0.901***	**[0.85, 0.998]**	0.977	[0.883, 1.103]	0.968	[0.902, 1.058]	0.957	[0.881, 1.043]	1.096	[0.971, 1.245]	1.011	[0.93, 1.104]	**1.112***	**[1.003, 1.274]**	1.068+	[0.99, 1.156]
Direct effect	0.916	[0.836, 1.045]	0.989	[0.881, 1.135]	0.98	[0.909, 1.076]	1.004	[0.914, 1.104]	1.021	[0.934, 1.111]	1.013	[0.919, 1.118]	1.112+	[0.988, 1.271]	1.065	[0.975, 1.166]
Indirect effect	0.984	[0.943, 1.042]	0.988	[0.948, 1.037]	0.988	[0.961, 1.017]	**0.953****	**[0.928, 0.986]**	**1.073****	**[1.014, 1.145]**	0.999	[0.963, 1.033]	1.001	[0.958, 1.074]	1.003	[0.974, 1.032]

(*Continued*)

Table 3. Continued

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
Women																
BMI																
Total effect	0.971	[0.886, 1.076]	0.913+	[0.836, 1.001]	0.957	[0.865, 1.077]	0.912+	[0.852, 1.001]	0.97	[0.866, 1.113]	0.982	[0.887, 1.093]	1.076	[0.953, 1.207]	0.989	[0.893, 1.099]
Direct effect	0.966	[0.882, 1.067]	0.925+	[0.85, 1.013]	0.941	[0.853, 1.046]	**0.912***	**[0.856, 0.988]**	0.974	[0.869, 1.084]	0.975	[0.89, 1.074]	1.01	[0.924, 1.125]	0.962	[0.879, 1.056]
Indirect effect	1.006	[0.966, 1.05]	0.987	[0.949, 1.025]	1.017	[0.972, 1.068]	1	[0.97, 1.045]	0.995	[0.965, 1.054]	1.008	[0.963, 1.047]	1.065+	[0.99, 1.135]	1.029	[0.986, 1.072]
Interviewer-rated body shape																
Total effect	0.956	[0.849, 1.069]	1.025	[0.934, 1.13]	0.931	[0.831, 1.032]	0.965	[0.874, 1.051]	0.934	[0.838, 1.057]	0.966	[0.869, 1.076]	**0.896***	**[0.818, 0.983]**	0.974	[0.879, 1.071]
Direct effect	0.974	[0.85, 1.105]	1.043	[0.943, 1.164]	0.938	[0.832, 1.044]	0.962	[0.861, 1.053]	0.897+	[0.809, 1.019]	0.989	[0.882, 1.097]	**0.893***	**[0.812, 0.975]**	0.984	[0.888, 1.081]
Indirect effect	0.982	[0.945, 1.027]	0.982	[0.95, 1.014]	0.992	[0.95, 1.037]	1.003	[0.974, 1.041]	**1.041***	**[1.004, 1.085]**	0.978	[0.944, 1.02]	1.003	[0.977, 1.052]	0.99	[0.955, 1.028]

Note: +$P < .1$, *$P < .05$, **$P < .01$, ***$P < .001$. Total effect, indirect effect, and direct effect in the mediation analysis compute the interquartile differences between the 25th (BMI: 25.25, interviewer-rated body shape: 2) and 75th percentile (BMI: 32.56, interviewer-rated body shape: 4) of obesity on sexuality. The 95 percent CI means the confidence intervals estimated based on the [2.5, 97.5] percentiles of 2,000 stratified cluster bootstrap samples. The coefficients statistically significant at 5% level of confidence are in boldface values and underlined. Four of the outcomes measures—the frequency of thinking about sex, the frequency of masturbation, the frequency of performing vaginal intercourse, and the frequency of receiving sexual touch in the last 12 months—were dichotomized in the mediation analysis. For solitary sexuality, we distinguish those respondents who responded never or less than once a month think about sex from those responded one to a few times a month or more and distinguish those who had any masturbation in the last 12 months to those who do not. For partnered sexual activities, we distinguish those respondents who responded usually or always had vaginal intercourse and receiving sexual touch from those responded never, rarely, or sometimes.

Then, we present the estimates on the mediating role of interviewer-rated attractiveness between body weight and sexuality in Tables 4 and 5. In contrast to the findings for functional limitations, the estimates from Table 4 show that interviewer-rated attractiveness does not mediate the influence of the BMI, after controlling for rated body shape, on any measure of sexuality, including solitary sex, partnership, and partnered sexual activities. However, we found statistically significant effects of socially perceived attractiveness as the mediator between interviewer-rated body shape, partnership, and almost all partnered sexual activities. Specifically, if respondents were rated with an obese body shape and then subsequently experienced the level of attractiveness that they would have experienced with that body shape rather than the level of attractiveness they would have experienced if they had a slim body shape, they have lower odds of having a partner (**OR** = 0.927, 95 percent **CI**: [0.892, 0.971), being sexually active (**OR** = 0.945, 95 percent **CI**: [0.910, 0.987]), frequently having vaginal intercourse (**OR** = 0.942, 95 percent **CI**: [0.908, 0.983]), and receiving sexual touch (**OR** = 0.952, 95 percent **CI**: [0.915, 0.992]), and higher odds of finding sex not pleasurable (**OR** = 1.050, 95 percent **CI**: [1.005, 1.091]). As shown in Table 5, we show that the mediating mechanism also differs for men and women. While socially perceived attractiveness is the mechanism for access to partnership for both men and women, we found that it is the mechanism in the outcomes of having had any sex and finding sex not pleasurable only for men and in the outcomes of having vaginal intercourse and receiving sexual touch only for women.

Body size could affect partnership and sexuality through perceived attractiveness not only by others but also by one's own psychosocial processes in self-esteem. As a robustness analysis, we estimated the multivariate mediation model with both respondents' own perception of self-esteem and interviewer-rated attractiveness, with the results remaining substantively the same (see Supplementary Appendices A and D, for details).

Discussion and conclusion

This paper focuses on the links between body weight for size and body shape as characteristics of individuals that affect perceived attractiveness and physical functioning, which, in turn, affect the social goods of access to intimate partnership and partnered sexual behavior. We compare sexual behavior with a partner, sexual intercourse, sexual touch, oral sex, and sexual problems to solitary sexuality in thinking about sex and masturbation. Then, we develop and test hypotheses about how these processes differ for women and men.

To summarize our results briefly, both measures of body size are negatively associated with later access to partnership and partnered sexual activities but have little to no relationship with solitary sexual activities. The negative association between large body size and sexuality is more pronounced for women than for men. Functional limitations and attractiveness mediate the relationship between body size, body shape, and partnered sexual activity, with large body size potentially reducing both physical capability and perceived attractiveness, thereby influencing sexual outcomes.

Although there is a body of research that examines ratings of attractiveness by weight for men and women (Brierley et al. 2016), virtually no literature exists on the *social processes* that link body size with sexuality. We contribute to such literature as follows: first, we measure body size in two ways—as weight for height in the BMI and separately as body shape rated by an independent observer from thin to obese. These two measures primarily capture the physiological effects (BMI) versus the social presentation of weight in rated body shape. They are distinct, with a low correlation between them (0.1185). Second, we assess the association between body size and access to partnership and partnered sexuality and test the mediating role of attractiveness and functional limitations in this process. Third, we test the hypothesis that the association between body size and sexuality through attractiveness and functional limitations differs for men and women.

Table 4. Results from mediation analysis of body size on partnership and sexual activities by interviewer-rated attractiveness.

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
BMI																
Total effect	1.02	[0.95, 1.091]	**0.922***	**[0.853, 0.986]**	0.979	[0.914, 1.047]	**0.931***	**[0.878, 0.99]**	0.951	[0.888, 1.035]	0.992	[0.922, 1.063]	0.992	[0.888, 1.101]	0.997	[0.916, 1.077]
Direct effect	1.021	[0.952, 1.098]	0.936+	[0.868, 1]	0.972	[0.903, 1.04]	**0.939***	**[0.885, 0.996]**	0.95	[0.888, 1.024]	0.986	[0.911, 1.056]	0.982	[0.885, 1.082]	0.979	[0.903, 1.054]
Indirect effect	0.998	[0.978, 1.022]	0.985	[0.964, 1.007]	1.007	[0.979, 1.041]	0.992	[0.972, 1.017]	1.001	[0.982, 1.033]	1.007	[0.982, 1.035]	1.01	[0.976, 1.045]	1.018	[0.993, 1.048]
Interviewer-rated body shape																
Total effect	0.93+	[0.872, 1.003]	1.002	[0.945, 1.072]	0.949	[0.892, 1.017]	0.961	[0.9, 1.024]	1.008	[0.931, 1.095]	0.988	[0.926, 1.055]	0.994	[0.932, 1.084]	1.019	[0.959, 1.083]
Direct effect	0.971	[0.889, 1.064]	0.997	[0.928, 1.083]	1.023	[0.953, 1.097]	1.017	[0.936, 1.094]	0.96	[0.905, 1.024]	1.049	[0.973, 1.126]	1.018	[0.944, 1.119]	1.07+	[0.998, 1.142]
Indirect effect	0.958	[0.909, 1.021]	1.005	[0.96, 1.051]	**0.927*****	**[0.892, 0.971]**	**0.945****	**[0.91, 0.987]**	**1.05***	**[1.005, 1.091]**	**0.942****	**[0.908, 0.983]**	0.977	[0.932, 1.03]	**0.952***	**[0.915, 0.992]**

Note: +$P < .1$, *$P < .05$, **$P < .01$, ***$P < .001$. Total effect, indirect effect, and direct effect in the mediation analysis compute the interquartile differences between the 25th (BMI: 25.25, interviewer-rated body shape: 2) and 75th percentile (BMI: 32.56, interviewer-rated body shape: 4) of obesity on sexuality. The 95 percent CI means the confidence intervals estimated based on the [2.5, 97.5] percentiles of 2,000 stratified cluster bootstrap samples. The coefficients statistically significant at 5% level of confidence are in boldface values and underlined. Four of the outcomes measures—the frequency of thinking about sex, the frequency of masturbation, the frequency of performing vaginal intercourse, and the frequency of receiving sexual touch in the last 12 months—were dichotomized in the mediation analysis. For solitary sexuality, we distinguish those respondents who responded never or less than once a month think about sex from those responded one to a few times a month or more and distinguish those who had any masturbation in the last 12 months to those who do not. For partnered sexual activities, we distinguish those respondents who responded usually or always had vaginal intercourse and receiving sexual touch from those responded never, rarely, or sometimes.

Table 5. Results from mediation analysis of body size on solitary sex, partnership, and sexual activities by interviewer-rated attractiveness, stratified by gender.

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
Men																
BMI																
Total effect	1.072	[0.978, 1.157]	0.934	[0.832, 1.034]	1.003	[0.918, 1.092]	0.947	[0.849, 1.044]	0.929	[0.827, 1.039]	1.004	[0.913, 1.096]	0.908	[0.776, 1.053]	1.009	[0.887, 1.136]
Direct effect	1.068	[0.962, 1.16]	0.948	[0.843, 1.05]	1.002	[0.907, 1.09]	0.959	[0.865, 1.05]	0.933	[0.814, 1.063]	0.988	[0.892, 1.094]	0.921	[0.784, 1.071]	0.988	[0.87, 1.111]
Indirect effect	1.004	[0.978, 1.03]	0.985	[0.961, 1.012]	1.001	[0.962, 1.043]	0.987	[0.964, 1.013]	0.996	[0.963, 1.042]	1.016	[0.983, 1.049]	0.987	[0.963, 1.022]	1.022	[0.989, 1.056]
Interviewer-rated body shape																
Total effect	**0.901***	**[0.85, 0.998]**	0.977	[0.883, 1.103]	0.968	[0.902, 1.058]	0.957	[0.881, 1.043]	1.096	[0.971, 1.245]	1.011	[0.93, 1.104]	**1.112***	**[1.003, 1.274]**	1.068+	[0.99, 1.156]
Direct effect	0.936	[0.814, 1.088]	0.987	[0.867, 1.146]	1.047	[0.965, 1.137]	1.045	[0.946, 1.153]	1.029	[0.941, 1.137]	1.064	[0.964, 1.173]	**1.164***	**[1.029, 1.378]**	**1.111***	**[1.002, 1.224]**
Indirect effect	0.963	[0.882, 1.085]	0.99	[0.92, 1.062]	**0.925***	**[0.873, 0.994]**	**0.916****	**[0.863, 0.979]**	**1.065***	**[1.001, 1.128]**	0.951	[0.895, 1.017]	0.955	[0.87, 1.047]	0.961	[0.904, 1.027]

(*Continued*)

Table 5. Continued

	Think sex		Masturbated in the last 12 months		Have a marital, romantic, intimate, or sexual partner		Had any sex in the last 3 months		Finding sex not pleasurable in the last 12 months		Performed vaginal intercourse in the last 12 months frequently		Receiving any oral sex in the last 12 months		Received sexual touch in the last 12 months frequently	
	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI	OR	95 percent CI
Women																
BMI																
Total effect	0.971	[0.886, 1.076]	0.913+	[0.836, 1.001]	0.957	[0.865, 1.077]	0.912+	[0.852, 1.001]	0.97	[0.866, 1.113]	0.982	[0.887, 1.093]	1.076	[0.953, 1.207]	0.989	[0.893, 1.099]
Direct effect	0.981	[0.89, 1.093]	0.924+	[0.846, 1.013]	0.947	[0.861, 1.052]	**0.919***	**[0.862, 0.997]**	0.966	[0.869, 1.078]	0.986	[0.898, 1.082]	1.039	[0.94, 1.153]	0.978	[0.888, 1.071]
Indirect effect	0.99	[0.956, 1.028]	0.988	[0.958, 1.021]	1.011	[0.971, 1.057]	0.992	[0.961, 1.038]	1.004	[0.968, 1.06]	0.997	[0.956, 1.037]	1.036	[0.97, 1.098]	1.012	[0.976, 1.053]
Interviewer-rated body shape																
Total effect	0.956	[0.849, 1.069]	1.025	[0.934, 1.13]	0.931	[0.831, 1.032]	0.965	[0.874, 1.051]	0.934	[0.838, 1.057]	0.966	[0.869, 1.076]	**0.896***	**[0.818, 0.983]**	0.974	[0.879, 1.071]
Direct effect	1.003	[0.877, 1.14]	1.006	[0.912, 1.115]	1.003	[0.884, 1.121]	0.993	[0.878, 1.104]	0.901+	[0.824, 1.007]	1.035	[0.911, 1.165]	**0.901***	**[0.818, 0.991]**	1.032	[0.915, 1.149]
Indirect effect	0.953	[0.905, 1.01]	1.018	[0.972, 1.066]	**0.928****	**[0.883, 0.976]**	0.972	[0.931, 1.028]	1.037+	[0.995, 1.084]	**0.934****	**[0.893, 0.984]**	0.995	[0.958, 1.047]	**0.944***	**[0.897, 0.995]**

Note: + $P < .1$, * $P < .05$, ** $P < .01$, *** $P < .001$. Total effect, indirect effect, and direct effect in the mediation analysis compute the interquartile differences between the 25th (BMI: 25.25, interviewer-rated body shape: 2) and 75th percentile (BMI: 32.56, interviewer-rated body shape: 4) of obesity on sexuality. The 95 percent CI means the confidence intervals estimated based on the [2.5, 97.5] percentiles of 2,000 stratified cluster bootstrap samples. The coefficients statistically significant at 5% level of confidence are in boldface values and underlined. Four of the outcomes measures—the frequency of thinking about sex, the frequency of masturbation, the frequency of performing vaginal intercourse, and the frequency of receiving sexual touch in the last 12 months—were dichotomized in the mediation analysis. For solitary sexuality, we distinguish those respondents who responded never or less than once a month think about sex from those responded one to a few times a month or more and distinguish those who had any masturbation in the last 12 months to those who do not. For partnered sexual activities, we distinguish those respondents who responded usually or always had vaginal intercourse and receiving sexual touch from those responded never, rarely, or sometimes.

We find no association between either the BMI or rated body shape and the odds of masturbating, for either men or women. We argue that body size does not come into play either as a social or a functional characteristic in sexual behavior that does not require a partner. Our results support this reasoning. We find for our other measure of solitary sexuality, thinking about sex, the odds increase with the BMI and decrease with rated body shape for both men and women. This surprising finding requires further study.

For our other measures, all of which require a partner, we find that the BMI and rated body shape operate in the same way, creating or widening a gap between men and women. In some cases, including sexual touch, vaginal intercourse, and finding sex not pleasurable (reverse-coded), the odds of this behavior do not change with increasing BMI or rated body shape for men but decrease (increase for sex not pleasurable) significantly for women. Hence, women are "punished" for having larger bodies and men are not. In other cases, such as having an intimate partner and receiving oral sex, the odds of this outcome increase with the BMI and rated body shape for men and decrease or remain the same for women. Thus, the gap between the genders becomes significant, to the detriment of women. We see no outcomes in which increases in body size reduce access to partnered sex for men. With the single exception of finding sex not pleasurable by rated body shape, we see no outcomes in which larger body size does not disadvantage women. Given the range of outcomes we consider, there is impressive consistency in the patterns observed.

Next, we examine the mechanisms through which body size might affect sexuality. We focus on the increases in the number of physical limitations at higher weights (Himes 2000) and the links between ratings of attractiveness and weight (Brierley et al. 2016). Our results show that attractiveness plays no role in mediating the relationship between the BMI and any outcome we examine. However, it does for interviewer-rated body shape. The odds of having a partner and of all the other sexual outcomes were significantly lower at the level of attractiveness associated with a larger-rated body shape, for both men and women. Attractiveness acts as a mediator for men for being sexually active and for finding sex not pleasurable. For women, attractiveness mediates the relationship between rated body shape and vaginal intercourse, and sexual touch.

We hypothesized that the limitations in physical functioning that often accompany large body size might affect access to partnered sexual behavior. We found some evidence of this in reports of finding sex not pleasurable, for both men and women. Furthermore, we found suggestive evidence that functional limitations act as a mechanism to link rated body size with odds of sex with a partner, again for both genders.

The BMI has been roundly criticized as biased, inaccurate, coarse, and not strongly linked to health (Burkhauser and Cawley 2008). Gutin (2018) pointed to the heavy social framing around the use of the BMI as a measure of health. We find, however, surprising consistency with both partnership and partnered sexuality in the association between the BMI and socially evaluated body shape. For the most part, for the social processes of partnership and partnered sexuality that we study here, either one or the other does the job. This is the case whether we included both in our models or modeled them separately. Note that the influences of the BMI and rated body shape are mediated by different characteristics.

Our study has several limitations. First, our data on sexual ideation and activities are based on self-reports and may be subject to social desirability or recall bias (Das and Laumann 2010). Second, our sample is nationally representative of older adults in the United States and may not be generalizable to other age groups or cultural contexts. Future work should examine how obesity and sexuality vary across the life course and across societies. Third, the evaluation of beauty may be influenced by how the body shape conforms to the culturally appropriate feminine or masculine norms that vary across racial and ethnic groups (Glasser et al. 2009). Given that the majority of respondents in the NSHAP sample are White, we have limited statistical power to accurately estimate the racial differences in the gender disparities of obesity on sexuality. The racial composition of the sample may also limit the generalizability of our results to

different racial-ethnic groups with diverging cultures and practices toward body shape and size as attractive. Fourth, concurrently modeling BMI and interviewer-rated body shape assumes the absence of confoundedness of two variables. We show in Supplementary Appendices B and C that our results remain substantively the same when separately assessing the influence of either measure of obesity on partnership on sexuality. Fifth, despite the richness of the NSHAP data, it does not include an equally extensive battery of measures on the self-perception of attractiveness similar to interviewer-rated attractiveness. As shown in Supplementary Appendix D, we show that our results on the mediating role of attractiveness remain robust when we also include self-esteem in multivariate mediation analysis.

Despite these limitations, our findings suggest the need for gender-specific interventions to address the social stigmatization and discrimination around weight that affect women's self-esteem, body image, and psychological well-being. Sexual education programs should encourage men and women of all body sizes and shapes to explore alternative ways of expressing intimacy and pleasure that are not limited by social or functional barriers. Reducing social barriers to partnership and sexuality as one prefers becomes especially important as improvements in life expectancy and declines in later-life disability increase the number of older adults who might benefit from access to partnered sex.

Our evidence on body size partially supports the historical argument made by Mead (1934) and Goffman (1956) that social experience and structure play an important role, beyond physiological organisms, in shaping access to social goods, such as partnership and intimate sex. We also contribute to such a line of inquiry by showing how gender—as a social structure—leads to diverging social standards of ideal body size and evaluations of physical attractiveness for women and men. The social evaluation and construction of one's body size as slim or large and evaluations of attractiveness play a smaller role, if any, for men than for women. Our research speaks to the long-standing debates and research within social science about how the social evaluations of physical characteristics take place, the conditions under which they matter, and structural differences by gender. "In analyzing the self, then we are drawn from its possessor, from the person who will profit or lose most by it, for he and his body merely provide the peg on which thing of collaborative manufacture will be hung for a time. And the means for producing and maintaining selves do not reside inside the peg; in fact, these means are often bolted down in social establishments" (Goffman 1956: 253).

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Endnotes

1. Although R3 (2015–2016) and R4 (2020-22) are more recent, they lack measures of oral sex, vaginal intercourse, and sexual touching.
2. The preliminary analysis show the results remain substantively the same when analyzing the multiply imputed data to incorporate the respondents (n=20) with missingness in covariates.

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Supplementary material

Supplementary material is available at *Social Forces* online.

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Conflicts of interest

None declared.

Data availability

The data of the National Social Life, Health, and Aging Project used in this study are available as restricted-use files from the Inter-university Consortium for Political and Social Research via https://www.icpsr.umich.edu/web/NACDA/studies/34921.

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