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Association of lifestyle and relationship factors with sexual functioning of women during midlife

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Abstract

Introduction—As women progress through menopause, they experience changes in sexual functioning that are multi-factorial, likely encompassing biologic, psychological, and social domains.

Aim—To examine the effects that physical activity, sleep difficulties, and social support have on partnered sexual activity and sexual functioning in women at different stages of the menopausal progression.

Methods—As part of an ongoing 5-year longitudinal study, we conducted a cross-sectional analysis of sexual functioning data.

Main outcome measures—Participation in partnered sexual activities, reasons for non-participation in such activities among sexually inactive women, and, among sexually active women, sexual functioning defined as engagement in and enjoyment of sexually intimate activities.

Results—Of 677 participants aged 41-68, 68% had participated in any partnered sexual activities (i.e., were sexually active) during the past 6 months. Reasons for sexual inactivity included lack of a partner (70%), lack of interest in sex (12%) or in the current partner (5%), and physical problems (4%). Sexually active participants tended to be younger, married, more educated, have more social support in general, fewer comorbid medical illnesses, a lower body mass index, and a higher prevalence of vaginal dryness. Among the sexually active participants, their scores for engagement in activities ranging from kissing to sexual intercourse were higher if they were physically active,

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had more social support, and lacked sleeping difficulties. Likewise, scores for sexual enjoyment were higher if they were physically active, had more social support, and lacked vaginal dryness. Engagement and enjoyment scores were not associated with marital status or other factors.

Conclusions—In midlife women, having social support and being physically active are associated with enhanced sexual engagement and enjoyment.

Keywords

Sexual functioning; Menopause; Physical Activity; Social Support; Sleep

Introduction

As women progress through menopause, they experience many changes in their health and health-related quality of life, including changes in sexual functioning.¹⁻⁵ Much of the work in female sexual functioning has been based on the model described by Kaplan, Masters, and Johnson: desire → arousal → orgasm → resolution.⁶⁻⁸ A more recent model⁹ proposes that there are both emotional and physical stimulants and benefits of sexual intimacy. This new model brings both lifestyle and relationship factors to the forefront of understanding the determinants and consequences of women's sexual functioning and may be particularly applicable to midlife women.¹⁰⁻¹²

While a growing body of literature examines the importance of traditional hormonal factors (e.g., estrogen and testosterone) on sexual functioning during the progression through menopause, less work has focused on social factors such as lifestyle and relationships. Studies have indicated that lifestyle factors, which may also change over the stages of menopause, such as physical activity and sleep, affect sexual functioning to varying degrees. For example, higher levels of physical activity have been associated with higher levels of sexual satisfaction¹¹⁻¹³ and global sexual functioning.¹⁴ Less restful sleep has been associated with lower levels of physical pleasure with sexual activity.¹¹⁻¹⁵ However, studies regarding the impact of relationship status on sexual functioning have yielded disparate results. Studies have found that women in new sexually intimate relationships have higher levels of arousal and desire¹⁶⁻¹⁷ and better sexual response,¹⁰⁻¹¹⁻¹⁸ but that women in long-term relationships have higher levels of emotional satisfaction.¹⁵⁻¹⁹ In a British cohort, married women reported decreased quality of sex life and increased difficulty with intercourse,³ a finding not confirmed in a US population.¹ The issue of overall levels of social support, beyond partner status, has received less attention. Analyses in a cohort of patients with breast cancer found no impact of overall social support on sexual interest, dysfunction, or satisfaction.¹⁶

Aims

The present paper examines the effects of physical activity, sleep difficulties, and social support on partnered sexual activity and, among sexually active women, sexual functioning in women at different stages of menopause. Analyses are based on data from the second year of our 5-year longitudinal study examining the impact of menopause on health-related quality of life.

Methods

Study Participants and Setting

Between January and December 2005, women aged 40-65 years and receiving health care from a single, university-based, general internal medicine practice were invited to participate

in a 5-year longitudinal cohort study: Do Stage Transitions Result in Detectable Effects (STRIDE). This study was approved by the University Institutional Review Board and registered with clinicaltrials.gov (#NCT00097994). All participants provided written informed consent prior to participating in the study. Recruitment details have been described previously.²⁰

Data Collection and Processing

Of the original 728 STRIDE participants, 677 participants completed the second year study questions and serve as the analysis group. (Figure 1) Questions included information about sociodemographics, menopausal status, vaginal dryness, a list of nine medical conditions (heart disease, heart failure, depression, stroke, emphysema or lung disease, arthritis, cancer (other than skin cancer), diabetes, and high blood pressure (summarized as 0, 1-2, and ≥ 3 medical comorbidities), physical activity, sleep difficulties, and social support. Subject height and weight were abstracted from the subject's medical record to determine body mass index (BMI calculated as weight in kilograms/ height in meters squared). Subjects also answered questions regarding participation in sexual activities and sexual functioning originally developed for the Study of Women's Health Across the Nation (SWAN)¹⁵⁻²¹ that are the focus of the analyses reported here.

All surveys were administered using Internet-based forms. The participants could complete the surveys on a touch-screen computer during a physician office visit or at home, either over the Internet or by telephone with the research assistant. If the survey was administered by telephone, the research assistant read the questions from, and entered responses directly into, the computerized form.

Stage of Menopause and Symptoms

Stage of menopause was based on the participants' self-reported bleeding patterns based on the Stages of Reproductive Aging Workshop criteria, with the exception of the definition of early menopausal transition.²² Participants were asked if they had regular bleeding patterns. If they did not, they were asked if their last menstrual (LMP) occurred: <3 months ago; ≥ 3 and <12 months ago; ≥ 12 months ago; or ≥ 5 years ago. Participants were considered in the reproductive stage if they experienced regular menstrual periods; early menopausal transition if they had irregular bleeding patterns but their LMP occurred <3 months ago; late menopausal transition if their LMP ≥ 3 and <12 months ago; early postmenopausal if their LMP was ≥ 12 months and <5 years ago; and late postmenopausal if their LMP was ≥ 5 years ago. Participants who reported either having had a hysterectomy or taking oral contraceptive pills could not be classified by bleeding pattern and were placed into 2 separate groups. Information about oophorectomy status was not collected. Hormone therapy (HT) use was defined as taking any estrogen with or without progesterone, including oral contraceptive pills.

Based on questionnaire design, all participants, with the exception of those who reported taking oral contraceptive pills, reported the frequency of vaginal dryness on a 5-point Likert scale ranging from 1 (never) to 5 (all of the time).

Physical Activity, Sleep, and Social Support

Physical activity was assessed using the following yes/no question based on guidelines from the Centers for Disease Control and Prevention and the American College of Sports Medicine²³: "Do you get at least 30 minutes of physical activity 5 days a week? (This can be in 10-minute increments and can include walking, gardening, cycling, arm cycling, etc.)."

Sleep difficulty was assessed by asking participants if they were: 1) having trouble falling asleep; 2) waking up several times a night; and 3) waking up earlier than intended during the past 2 weeks. Response options, on a 5-point Likert scale, ranged from 1 (no, not in the past 2 weeks) to 5 (yes, 5 or more times a week). Participants reporting any of the 3 problems at least 3 times a week (4 or 5 on the Likert scale) were considered to have sleep difficulty. This frequency criterion is consistent with the criterion often used in insomnia research.^{24, 25}

Additionally, participants were asked “How many hours a night do you usually sleep: 1) During the week?; 2) On the weekends?” with response options ranging from 0-24 hours. A summary of sleep hours average was created by multiplying the weekday sleep hours by 5 and weekend sleep hours by 2, summing, and dividing by 7. Because sleep hours were not normally distributed and disorder could be seen at either extreme (too much or too little sleep), sleep hours were categorized as ≤ 6 hours, >6 and <9 hours, and ≥ 9 hours per night.

Social support was measured using the 12-item Interpersonal Support Evaluation List (ISEL).^{26, 27} The ISEL includes questions representing three aspects of social support: appraisal; belonging; and tangible support. The items combine to create the overall scale. Because the data were not normally distributed, the ISEL was divided into 3 categories representing low (<2.5), moderate (2.5-3.49), and high (≥ 3.5) levels of social support.

Sexual Activity

All participants were asked about participation in partnered sexual activities. Women were classified as sexually active or inactive with a partner based on their response (yes/ no) to the following question: During the past 6 months, have you engaged in any sexual activities (ranging from hugging and kissing to sexual intercourse) with a partner (either a man or woman)? Those who answered yes were considered sexually active and asked a series of questions about sexual functioning. Women who answered no were considered sexually inactive and asked to select the single most important reason for their inactivity from a list of 6 reasons (Table 3).

Because these sexual functioning questions have previously been used as individual questions, not as scales, we initially conducted a principal components factor analysis with oblique rotation first in the STRIDE cohort and then confirmed it in the SWAN sample (described in the results section). Based on these results, we created 3 sexual functioning scales: 1) engagement in sexually intimate activities; 2) enjoyment of sexually intimate activities (our 2 main outcome variables); and 3) pain and lubrication use with sexual intercourse (not discussed here). Questions that pertained to engagement in sexual activity focused on the importance, desire, and types of sexual contact, while questions that pertained to the enjoyment of sexual activity focused on physical and emotional satisfaction, and arousal. (Table 1)

Analyses

We carried out cross-sectional analyses of the second-year cohort. (Figure 1) First, we examined the cohort as a whole to describe the participants in the sexually active and sexually inactive groups and examine the reasons for sexual inactivity (group 1). To compare the active and inactive groups, we used *t*-tests for continuous variables and chi-square tests for categorical variables. We focused on the impact of 2 lifestyle factors (physical activity and sleep difficulty) and 1 relationship factor (social support) on participation in partnered sexual activity. We entered covariables with a univariable significance of $<.1$ into subsequent multivariable logistic models examining the dichotomous outcome of sexual activity (yes/no). Next, we examined the impact of 2

lifestyle factors (physical activity and sleep difficulty) and 1 relationship factor (social support) on sexual functioning among women who had participated in any partnered sexual activity in the last 6 months (group 2). These analyses excluded participants who were sexually inactive and participants who had any missing data concerning sexual functioning. Finally, we repeated the sexual functioning analyses but included participant reported vaginal dryness (group 3). These analyses also excluded participants who were taking oral contraceptive pills because these women were not asked about their experience of menopausal symptoms, including vaginal dryness.

We used linear regression models to analyze engagement in sexual activity. Because enjoyment scores were not normally distributed, we divided enjoyment into 4 categories: low (<1.5), moderate (1.5-2.49), high (2.5-3.49), and very high (≥ 3.5) and used ordered logistic regression models for analyses. We considered variables with an univariable significance of $P < .1$ for entry into multivariable models. These included: a model that examined lifestyle factors (physical activity and sleep); a model that examined relationship factors (social support); and a model that examined both lifestyle and relationship factors. We included menopausal status in all multivariable models.

All analyses were conducted using STATA 9.0 (Stata Corp., College Station, TX). We considered a p-value of $<.05$ to be significant.

Main Outcome Measures

The principal outcome measures include: 1) participation in partnered sexual activities; and, among women who participate in partnered sexual activities, 2) engagement in; and 3) enjoyment of sexually intimate activity.

Results

Factor Analysis of Sexual Functioning Questions

We conducted a principal components analysis with oblique rotation and identified 3 sexual functioning factors: 1) Engagement in sexually intimate activities; 2) Enjoyment of sexually intimate activities; and 3) Pain and lubrication (not discussed in this paper). (Table 1) With the exception of kissing, which loaded on both the engagement factor (0.53) and the pain and lubrication factor (0.46), each item had a factor loading of >0.4 on a single outcome scale. We believed it was most parsimonious to place kissing with the engagement factor. Tests of reliability indicated adequate internal consistency in both the engagement and enjoyment scales (Cronbach's $\alpha=0.75$ and 0.76 , respectively). A confirmatory factor analysis was conducted in a subset of data from the SWAN cohort. This data set yielded an identical factor structure with similar internal consistency for the engagement and enjoyment scales (Cronbach's $\alpha=0.77$ and 0.84 , respectively; manuscript in preparation).

Characteristics of Study Participants

Of the 728 participants enrolled in STRIDE, 677 (93%) completed second-year questionnaires. Of these 677 participants, 459 (68%) were classified as being sexually active based on answering yes to the question: "During the past 6 months, have you engaged in any sexual activities (ranging from hugging and kissing to sexual intercourse) with a partner (either a man or woman)?" Figure 1 shows the number of subjects included in each analysis group; Table 2 shows the characteristics of the group overall and the sexually active and inactive subgroups.

Characteristics of Sexually Active and Sexually Inactive Women

Univariable analyses comparing sexually active and inactive women (Table 2) showed that sexually active women were younger, had a higher level of educational attainment, had a lower BMI, and included a larger proportion of women who were: married; in earlier menopausal stage; had fewer medical conditions; and had vaginal dryness ($P < .001$ for each). There was no difference based on HT use ($p = .5$). The sexually active group had higher levels of overall social support ($p < .001$); there were no significant differences in physical activity or sleep difficulties, but women who slept between 6 and 9 hours a night were more likely to be sexually active than those sleeping 6 or fewer or 9 or more hours a night ($p = .02$).

In multivariable models, younger age, completing college, being in a married or committed relationship, having fewer medical comorbidities, reporting more vaginal dryness, and having high levels of social support continued to be associated with being sexually active; sleep hours were no longer significant. (Table 3)

Reasons for Sexual Inactivity

Of the 218 participants who were sexually inactive, the majority (70%) reported not having a current partner. (Table 4) Some reported a lack of interest in sexual activity in general (12%) or a lack of interest with the current partner (5%). Only 4% reported having a physical problem that interfered with sexual activity.

Factors Related to Engagement in Sexual Intimate Activities

In the subgroup of women who reported partnered sexual activity in the last 6 months, we found that scores for engagement in sexual activity were higher in physically active participants ($b, .2$; 95% confidence interval (CI), $.02-.3$; $p = .03$) and lower in women with sleep difficulties ($b, -.2$; 95% CI, $-.3-.04$; $p, .01$); there was no difference based on sleep hours. Compared to women with low levels of social support, women with moderate and high levels of social support reported higher levels of engagement ($b, .3$; 95% CI, $.1-.6$ and $b, .5$; 95% CI, $.3-.8$; $p, .006$ and $< .001$, respectively). Engagement was lower in late postmenopausal than reproductive participants ($b, -.3$; 95% CI, $-.5-.04$; $p, .02$). Although engagement was lower in women with a larger BMI, the difference was nonsignificant. Differences related to age, race, ethnicity, educational attainment, marital status, HT use and comorbid medical conditions were nonsignificant.

In the multivariable model (Table 5) examining lifestyle factors (physical activity and sleep) and controlling for menopausal status, higher engagement scores continued to be associated with being physically active, and lower engagement scores continued to be associated with sleep difficulties; BMI remained nonsignificant. In the multivariable model that examined the relationship factor (social support) and controlled for menopausal stage, higher engagement scores continued to be associated with moderate and high levels of social support; a larger BMI was also significant. In a multivariable model that combined the lifestyle and relationship factors, physical activity and moderate and high levels of social support remained significant, but sleep difficulty did not.

In the subgroup analysis examining vaginal dryness, univariable models showed no association between vaginal dryness and the engagement component of sexual functioning ($P = .99$).

Factors Related to Enjoyment of Sexual Activities

In univariable ordered logistic regression analyses of the sexually active subgroup, enjoyment scores were lower in older participants (Odds Ratio (OR), $.97$; 95% CI, $.94-.99$;

$p=.03$); in early postmenopausal versus reproductive participants (OR, .5; 95% CI, .3-.9; $p=.03$); in participants with sleep difficulties (OR, .7; 95% CI, .5-1.002; $p=.05$); and in participants with ≥ 3 versus 0 comorbid medical conditions (OR, .5; 95% CI, .3-.8; $p=.006$). Enjoyment scores were more likely to be higher in physically active participants and in participants with either moderate or high levels of social support (OR, 2.2, 95% CI, 1.2-4.1 and OR, 5.5; 95% CI, 2.9-10.3; $p=.01$ and $<.001$, respectively). There were no significant differences based on race, ethnicity, educational attainment, marital status, HT use, or BMI, or sleep hours.

In the multivariable model (Table 5) that examined lifestyle factors and controlled for menopausal stage, higher scores of enjoyment continued to be associated with being physically active but not with lack of sleep difficulties. In the multivariable model that examined social support and controlled for menopausal stage, higher levels of enjoyment continued to be associated with moderate and high levels of social support. In the multivariable models that combined lifestyle and relationship factors, moderate and high levels of social support remained significant but physical activity and sleep difficulty did not.

In the subgroup analysis that examined vaginal dryness, univariable models indicated that lower scores of enjoyment were associated with having vaginal dryness most (OR, 0.4; 95% CI, 0.2-0.7; $p=.001$) or all of the time (OR, 0.3; 95% CI, 0.2-0.6; $p=.001$) versus none of the time. In multivariable models that included vaginal dryness, being physically active (OR, 1.4; 95% CI, 1.0-2.1; $p=.07$) and lacking sleep difficulty (OR, 0.7; 95% CI, 0.5-1.0; $p=.08$) were no longer associated with higher levels of enjoyment. Compared to those who reported low levels of social support, those reporting moderate (OR, 2.3; 95% CI, 1.2-4.3; $P=.01$) and high levels of social support (OR, 6.6; 95% CI, 3.4-12.8; $P<.001$) continued to report higher levels of enjoyment.

Discussion

In our sample of midlife women, 68% reported that they had engaged in partnered sexual activities during the past 6 months. Consistent with other work, sexual inactivity was usually attributed to lack of a partner (reported by 70%). While sexually active women were more likely to report vaginal dryness, this may be because they have opportunity to experience vaginal dryness during intercourse.

As part of these analyses, we identified 3 scales (Engagement in and Enjoyment of sexually intimate activities and pain and lubrication) from questions developed for SWAN15, 21 and confirmed the factor structure using data from SWAN (manuscript in preparation). While these questions have not been externally validated, the confirmation of the multi-dimensional nature of these questions in two, independent samples, lends credibility to the scales identified and, as with other instruments used in female sexual functioning research, 28, 29 emphasizes the multi-dimensional nature of female sexual functioning.

In the 68% of women who were sexually active with a partner, our analyses focused on the relationships among lifestyle (physical activity and sleep difficulties) and relationship factors (social support) and sexual functioning (the engagement in and enjoyment of a range of sexually intimate activities). In multivariable models that adjusted for menopausal stage, we found that, irrespective of stage of menopause, being physically active and having higher levels of social support were associated with higher levels of engagement and enjoyment, while sleep difficulties were associated with lower levels of engagement. Neither engagement nor enjoyment was associated with HT use. The results for enjoyment were mitigated by the presence of vaginal dryness.

Our results, while cross-sectional, are consistent with the longitudinal results of others who found that higher levels of sexual satisfaction (similar to our enjoyment scale) were associated with higher levels of physical activity.^{13, 14} Our results expand on the findings related to sleep and sexual functioning in the SWAN cohort, which found that women with restless sleep had less physical pleasure than women with good sleep quality,¹⁵ to include an impact of sleep difficulties on both overall engagement in and enjoyment of sexual activities. Our finding that social support was associated with sexual functioning in the models that included marital status suggests that the quality of a woman's relationships with others in general may be more important than the type of intimate relationship with regards to better sexual functioning. This may help explain why some studies have found conflicting results with regard to the impact of marital status,^{1, 3} and it suggests the need for future studies to specifically explore the quality and duration of partner relationships.

Our study had several limitations. First, it is a cross sectional analysis and therefore causality cannot be determined and a woman's prior sexual functioning cannot be incorporated into our models. We will continue to follow our cohort and future work will report on longitudinal outcomes. Our questions used to assess sexual functioning have not been externally validated. While the factor structure is consistent in two independent samples, external validation is necessary and is being undertaken. We did not use detailed measures of physical activity and sleep. The questions we used meet guidelines for adequate physical activity and sleep disturbance and could practically be used in a general clinical setting (e.g., primary care encounter). Future research should include multi-dimensional measures including the ability to distinguish different types of physical activity. Based on questionnaire design, a subgroup of our women, those taking oral contraceptive pills, were not asked about vaginal dryness. These women tended to be younger than the population overall and vaginal dryness is a symptom that occurs later in menopause and persists. Additionally, we did not collect bleeding diaries to define stage of menopause, did not ascertain oophorectomy status, and do not have measures of estrogens and androgens. Future studies exploring sexuality in mid-life should include both biologic and social factors. Our women were able to complete study questions using multiple modalities (telephone, touch screen computers, and internet); we did not assess if mode of completion affected response. Finally, women in our study were recruited from a primary care population. While these women were not seeking care for menopause related conditions, they may be different than a general population sample, thus limiting the generalizability of our findings.

Conclusions

Our findings support the hypothesis that psychosocial influences on women's sexuality are important during the progression through menopause. While current research shows the potential for hormone therapy to improve sexual functioning in mid-life women,³⁰⁻³³ these psychosocial influences should continue to be explored, and, if substantiated, considered as additional targets for interventions designed to optimize sexual functioning during menopause.

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Figure 1.
Women included and excluded from each analysis group

Table 1
Questions about Sexual Functioning

Factor and Items ^a	Factor Loading
Engagement in sexually intimate activities (Chronbach's $\alpha=.75$)	
How important is sex in your life?	.43
During the past 6 months, how often have you felt the desire to engage in any form of sexual activity either alone or with a partner? Sexual activity can range from hugging and kissing to sexual intercourse.	.48
During the past 6 months, how often, on average, have you engaged in each of the following sexual activities:	
Kissing or hugging	.53
Sexual touching or caressing	.85
Oral sex	.70
Sexual intercourse	.92
Enjoyment of sexually intimate activities (Chronbach's $\alpha=.76$)	
In the past 6 months, how emotionally satisfying was your relationship with your main partner?	.62
During the past 6 months, how often have you felt aroused during sexual activity?	.93
During the past 6 months, how often did you feel satisfied after sexual activity?	.99
Pain and Lubrication	
During the past 6 months, have you felt vaginal or pelvic pain during intercourse?	.69
During the past 6 months, how often have you used lubricants, such as creams or jellies, to make sex more comfortable?	.75

^a Eigenvalues: Engagement: 3.4; Enjoyment: 1.7; Pain and Lubrication: 1.4

Table 2
Characteristics of Study Participants in the Total Group and in Two Subgroups ^a

Characteristic ^b	Total Group (N = 676)	Subgroups		
		Sexually Active (n = 458)	Sexually Inactive (n = 218)	P Value
Age, yr, mean $\pm$ SD	53.0 $\pm$ 6.5	52.3 $\pm$ 6.3	54.7 $\pm$ 6.6	<.001
Race, No. (%)				.001
White	517 (76)	371 (81)	146 (67)	
African American	135 (20)	71 (16)	64 (29)	
Native American	5 (1)	3 (1)	2 (1)	
Asian	12 (2)	9 (2)	3 (1)	
Other	7 (1)	4 (1)	3 (1)	
Ethnicity, non-Hispanic, No. (%)	664 (98)	451 (98)	213 (98)	.5
Education, No. (%)				<.001
High school or less	100 (15)	49 (11)	51 (23)	
Some college	182 (27)	116 (25)	66 (30)	
College degree	159 (24)	124 (27)	35 (16)	
Graduate degree	235 (35)	169 (37)	66 (30)	
Marital status, No. (%)				<.001
Single	141 (21)	56 (12)	85 (39)	
Married or in a committed relationship	392 (58)	344 (75)	48 (22)	
Divorced	112 (17)	50 (11)	62 (28)	
Widowed	31 (5)	8 (2)	23 (11)	
Menopausal status, No. (%)				<.001
Taking oral contraceptive pills	38 (6)	29 (6)	9 (4)	
Premenopausal	141 (21)	112 (24)	29 (13)	
Early perimenopausal	72 (11)	58 (13)	14 (6)	
Late perimenopausal	42 (6)	29 (6)	13 (6)	
Early postmenopausal	112 (17)	74 (16)	38 (17)	
Late postmenopausal	133 (20)	74 (16)	59 (27)	
Hysterectomy	138 (20)	82 (18)	56 (26)	
Physically active, yes, No. (%)	420 (62)	284 (62)	136 (62)	.9
Sleep difficulty, yes, No. (%)	362 (54)	239 (52)	123 (56)	.3
Sleep hours category, No. (%)				.02
$\leq$ 6 hours	182 (27)	110 (24)	72 (33)	
>6 and <9 hours	466 (69)	332 (72)	134 (61)	
$\geq$ 9 hours	29 (4)	17 (4)	12 (6)	
ISEL score category, No. (%)				<.001

Characteristic ^b	Total Group (N = 676)	Subgroups		
		Sexually Active (n = 458)	Sexually Inactive (n = 218)	P Value
Low (<2.5)	79 (12)	40 (9)	39 (18)	
Moderate (2.5-3.49)	334 (49)	216 (47)	118 (54)	
High (≥3.5)	263 (39)	202 (44)	61 (28)	
Medical comorbidities, No. (%)				<.001
0 comorbidities	178 (26)	150 (33)	28 (13)	
1-2 comorbidities	369 (55)	238 (52)	131 (60)	
≥3 comorbidities	129 (19)	70 (15)	59 (27)	
Body mass index, mean ± SD	29.9 ± 7.6	29.2 ± 7.1	31.4 ± 8.4	<.001
Hormone Therapy use, yes, No. (%)	93 (14)	66 (14)	27 (12)	.5
Vaginal dryness, No. (%)				<.001
Not at all	300 (47)	172 (40)	128 (61)	
Rarely	85 (13)	59 (14)	26 (12)	
Some of the time	114 (18)	84 (20)	30 (14)	
Most of the time	78 (12)	65 (15)	13 (6)	
All of the time	61 (10)	49 (11)	12 (6)	

^aSubgroups are based on whether participants reported having sexual activity with a partner during the past 6 months. Because of rounding, percentages may not total 100.

^bISEL indicates Interpersonal Support Evaluation List. For body mass index, numbers are for 674 participants. For vaginal dryness, numbers are for 638 participants.

Table 3
Multivariable predictors of reporting partnered sexual activity in the past 6 months

Characteristic	Odd Ratio (95% Confidence Interval)	P Value
Age (per year)	.90 (.87-.93)	<.001
Education		
High school or less (ref)	1	
Some college	1.8 (.95-3.4)	.07
College degree	3.4 (1.7-6.9)	.001
Graduate degree	1.7 (.9-3.3)	.1
Marital status		
Married or in a committed relationship (ref)	1	
Single	.07 (.04-.1)	<.001
Divorced	.1 (.06-.2)	<.001
Widowed	.06 (.02-.2)	<.001
ISEL score category		
Low (<2.5) (ref)	1	
Moderate (2.5-3.49)	1.2 (.6-2.2)	.6
High (≥3.5)	2.2 (1.1-4.3)	.03
Medical comorbidities, No. (%)		
0 comorbidities (ref)	1	
1-2 comorbidities	.5 (.3-.9)	.02
≥3 comorbidities	.5 (.3-1.0)	.052
Vaginal dryness		
Not at all (ref)	1	
Rarely	1.5 (.8-2.8)	.3
Some of the time	1.8 (1.0-3.3)	.04
Most of the time	3.3 (1.6-7.0)	.002
All of the time	2.4 (1.1-5.4)	.03

Table 4
Participant Responses When Asked about the Single Most Important Reason for Sexual Inactivity with a Partner ^a

Reason	No. (%) of Responses
I don't have a partner at this time	152 (70)
My partner has a physical problem that interferes with sex	12 (6)
I have a physical problem that interferes with sex	8 (4)
I am not interested in sexual activity	27 (12)
I am not interested in sexual activity with my partner	11 (5)
My partner is not interested in sexual activity	8 (4)

^aThe total number of responses was 218. Because of rounding, percentages may not total 100.

Table 5
Among sexually active women, multivariable predictors of higher levels of engagement in and enjoyment of partnered sexual activities

Characteristic ^a	Engagement		Enjoyment	
	(b; 95% CI) ^b	P Value	(OR; 95% CI)	P Value
Base Model: Lifestyle only				
Physically active (no is ref)	.2 (.02-.3)	.02	1.5 (1.0-2.1)	.04
Sleep difficulty (no is ref)	-.2 (-.3- -.02)	.02	.7 (.5-1.002)	.051
Menopausal status				
Taking oral contraceptive pills	-.02 (-.3-.3)	.9	1.05(.5-2.2)	.9
Premenopausal (ref)	1		1	
Early perimenopausal	-.003 (-.2-.2)	1.0	1.1 (.6-2.1)	.7
Late perimenopausal	-.2 (-.5-.1)	.2	.7 (.3-1.5)	.4
Early postmenopausal	-.1 (-.3-.1)	.3	.6 (.4-1.1)	.08
Late postmenopausal	-.2 (-.5- -.02)	.04	.6 (.3-1.1)	.1
Hysterectomy	-.1 (-.3-.1)	.5	.8 (.5-1.4)	.5
Medical comorbidities				
0 comorbidities (ref)			1	
1-2 comorbidities			.9 (.6-1.4)	.7
≥3 comorbidities			.6 (.3-1.02)	.06
Base Model: Relationship only				
ISEL score category				
Low (<2.5) (ref)	1		1	
Moderate (2.5-3.49)	.3 (.08-.6)	.009	2.2 (1.2-4.1)	.01
High (≥3.5)	.5 (.3-.8)	<.001	6.1 (3.2-11.4)	<.001
Menopausal status				
Taking oral contraceptive pills	-.05 (-.3-.2)	.8	1.1(.6-2.3)	.7
Premenopausal (ref)	1		1	
Early perimenopausal	-.03 (-.3-.2)	.8	1.1 (.6-1.9)	.8
Late perimenopausal	-.2 (-.5-.1)	.2	.6 (.3-1.3)	.2
Early postmenopausal	-.2 (-.4-.03)	.09	.5 (.3-.8)	.008
Late postmenopausal	-.3 (-.5- -.04)	.02	.5 (.3-.96)	.04
Hysterectomy	-.1 (-.3-.06)	.2	.6 (.3-.97)	.04
Body Mass Index	-.009 (-.02- -.001)	.047		
Full Model: Lifestyle and Relationship				
Physically active (no is ref)	.1 (.002-.3)	.047	1.3 (.9-2.0)	.1

Characteristic ^a	Engagement		Enjoyment	
	(b; 95% CI) ^b	P Value	(OR; 95% CI)	P Value
Sleep difficulty (no is ref)	-.1 (-.2-.03)	.1	.9 (.6-1.3)	.5
ISEL score category				
Low (<2.5) (ref)	1		1	
Moderate (2.5-3.49)	.3 (.07-.5)	.01	2.5 (1.2-4.0)	.01
High (≥3.5)	.5 (.2-.7)	<.001	5.3 (3.01-10.8)	<.001
Menopausal status				
Taking oral contraceptive pills	-.01 (-.3-.3)	.9	1.2(.6-2.6)	.7
Premenopausal (ref)	1		1	
Early perimenopausal	-.01 (-.2-.2)	.9	1.1 (.6-2.0)	.8
Late perimenopausal	-.2 (-.5-.1)	.2	.6 (.3-1.3)	.2
Early postmenopausal	-.1 (-.3-.07)	.2	.5 (.3-.9)	.02
Late postmenopausal	-.2 (-.5-.02)	.03	.5 (.3-.96)	.04
Hysterectomy	-.1 (-.3-.1)	.3	.6 (.3-1.02)	.06

^a Overall population 432, shaded areas were not included in the final model

^b CI: Confidence Interval; OR: Odds Ratio