

# Correlates of Sexual Satisfaction Among Sexually Active Postmenopausal Women in the Women's Health Initiative-Observational Study

Jennifer S. McCall-Hosenfeld, MD, MSc<sup>1</sup>, Sarah A. Jaramillo, MS<sup>2</sup>, Claudine Legault, PhD<sup>2</sup>, Karen M. Freund, MD, MPH<sup>3</sup>, Barbara B. Cochrane, PhD, RN<sup>4</sup>, JoAnn E. Manson, MD, DrPH<sup>5</sup>, Nanette K. Wenger, MD<sup>6</sup>, Charles B. Eaton, MD, MS<sup>7</sup>, Beatriz L. Rodriguez, MD, PhD<sup>8</sup>, S. Gene McNeeley, MD<sup>9</sup>, and Denise Bonds, MD, MPH<sup>10</sup>

<sup>1</sup>Division of General Internal Medicine and Department of Public Health Sciences, Pennsylvania State University College of Medicine, Hershey, PA, USA; <sup>2</sup>Division of Public Health Sciences, Wake Forest University School of Medicine, Winston-Salem, NC, USA; <sup>3</sup>Women's Health Unit, Department of Medicine and Women's Health Interdisciplinary Research Center, Boston University School of Medicine, Boston, MA, USA; <sup>4</sup>School of Nursing, University of Washington, Seattle, WA, USA; <sup>5</sup>Division of Preventive Medicine, Brigham and Women's Hospital Harvard Medical School, Boston, MA, USA; <sup>6</sup>Division of Cardiology, Emory University School of Medicine, Atlanta, GA, USA; <sup>7</sup>Brown University, Memorial Hospital of Rhode Island, Pawtucket, RI, USA; <sup>8</sup>Departments of Geriatric Medicine, Public Health Sciences and Epidemiology, University of Hawaii, Manoa, HI, USA; <sup>9</sup>Hutzel Women's Health, Wayne State University, Detroit, MI, USA; <sup>10</sup>Departments of Public Health Sciences and Medicine, University of Virginia, Charlottesville, VA, USA.

**BACKGROUND:** Satisfaction with sexual activity is important for health-related quality of life, but little is known about the sexual health of postmenopausal women.

**OBJECTIVE:** Describe factors associated with sexual satisfaction among sexually active postmenopausal women.

**DESIGN:** Cross-sectional analysis.

**PARTICIPANTS:** All members of the Women's Health Initiative-Observational Study (WHI-OS), ages 50–79, excluding women who did not respond to the sexual satisfaction question or reported no partnered sexual activity in the past year (N=46,525).

**MEASUREMENTS:** Primary outcome: dichotomous response to the question, "How satisfied are you with your sexual activity (satisfied versus unsatisfied)?" Covariates included sociodemographic factors, measures of physical and mental health, and gynecological variables, medications, and health behaviors related to female sexual health.

**RESULTS:** Of the cohort, 52% reported sexual activity with a partner in the past year, and 96% of these answered the sexual satisfaction question. Nonmodifiable factors associated with sexual dissatisfaction included age, identification with certain racial or ethnic groups, marital status, parity, and smoking history. Potentially modifiable factors included lower mental health status and use of SSRIs. The final model yielded a c-statistic of

0.613, reflecting only a modest ability to discriminate between the sexually satisfied and dissatisfied.

**CONCLUSIONS:** Among postmenopausal women, the variables selected for examination yielded modest ability to discriminate between sexually satisfied and dissatisfied participants. Further study is necessary to better describe the cofactors associated with sexual satisfaction in postmenopausal women.

**KEY WORDS:** sexual dysfunction; physiological; sexual dysfunctions; psychological; women; menopause; postmenopause; cohort studies.

J Gen Intern Med 23(12):2000–9

DOI: 10.1007/s11606-008-0820-9

© Society of General Internal Medicine 2008

## BACKGROUND

Sexual satisfaction is a domain of female sexual functioning measured by validated instruments.<sup>1–3</sup> Women remain sexually active throughout life,<sup>4,5</sup> and female sexual dysfunction is prevalent.<sup>6</sup> Older women have increased risk for sexual dysfunction,<sup>6</sup> which may manifest as decreased sexual satisfaction. Medical and psychiatric illness, lower socioeconomic status,<sup>6,7</sup> postmenopausal hormonal changes,<sup>5,8,9</sup> and pelvic surgery<sup>10,11</sup> may contribute. Premenopausal sexual desire and response disorders can worsen after menopause.<sup>12</sup>

Sexual satisfaction among postmenopausal women is inadequately described. Cross-sectional studies of female sexual functioning are compromised by low response rates<sup>13,14</sup> and use of convenience samples.<sup>14</sup> Large surveys<sup>6,15</sup> may select participants with nonrepresentative sexual attitudes. Prevalence estimates vary widely across studies.<sup>14</sup>

In the current project, cross-sectional data collected from the Women's Health Initiative Observational Cohort (WHI-OS<sup>16,17</sup>) were used to describe the prevalence and correlates of low sexual satisfaction in postmenopausal women.

---

Preliminary results from this work were presented at the Society of General Internal Medicine 30th Annual Meeting, Toronto, Ontario, Canada, on April 26, 2007.

Received March 27, 2008

Revised September 16, 2008

Accepted September 18, 2008

Published online October 7, 2008

## METHODS

**Inclusion Criteria.** Data from 93,676 participants were collected at baseline during screening visits. For most participants, a single screening visit was sufficient prior to data collection. For a minority of participants, up to three screening visits were required. Participants were postmenopausal women aged 50 to 79 years at the time of enrollment, recruited at 40 different clinical centers throughout the United States during 1994 through 1998.<sup>18</sup> Institutional review boards at all sites approved the study; informed consent was obtained from all participants. Liberal inclusion criteria enhanced generalizability. Inclusion criteria were postmenopausal status, intention to reside in the area for at least 3 years, and ability to provide written informed consent.<sup>18,19</sup>

**Exclusion Criteria.** Participants were excluded from the WHI if they had comorbid conditions that limited their survival to less than 3 years or if they had conditions (such as substance abuse or dementia) that would affect their ability to follow-up.<sup>18,19</sup> Because lack of an available partner may contribute to low sexual satisfaction in older women,<sup>6</sup> participants who answered “no” to the question “Did you have sexual activity with a partner in the past year?” were excluded from this analysis.

**Definitions of Variables.** Data were obtained from survey responses as previously described.<sup>17,20,21</sup> Sexual satisfaction was assessed by a single item categorized along a four-point Likert-type scale from very unsatisfied to very satisfied, “How satisfied are you with your current sexual activities, either with a partner or alone?”<sup>22,23</sup> Satisfaction with sexual frequency was assessed by the question, “Are you satisfied with the frequency of your sexual activity, or would you like to have sex more or less often?” Response categories included “less often,” “satisfied with current frequency,” “more often,” and “don’t want to answer.”

Variables chosen for examination were the result of a comprehensive literature review of factors previously reported to be associated with female sexual dysfunction. A conceptual model for correlates of sexual satisfaction included the following interdependent categories of variables: socioeconomic/demographic variables, physical health status, mental health status, medications, gynecological history, and health behaviors. By consensus and discussion among coauthors, variables that were more distal along our proposed causal pathway were removed. For example, we excluded specific disease states that may impact sexual functioning in favor of a more proximal measure of the effect of these diseases, the subscales of the RAND 36-Item Health Survey (SF-36) that relate to physical health.

Socioeconomic/demographic variables selected for examination were age,<sup>5,6,24,25</sup> marital status,<sup>6,24</sup> family income,<sup>6</sup> race/ethnicity,<sup>6,15,26</sup> education level,<sup>6,26</sup> and type of employment.<sup>6,26</sup> Sexual orientation<sup>27,28</sup> was defined as described by Valanis and colleagues.<sup>21</sup>

For physical health,<sup>6,25,26,29–31</sup> the four subscales of the SF-36 that aggregate to physical health (physical functioning, role limitations due to physical problems, bodily pain, and general health) were assessed.<sup>32,33</sup> Mental health<sup>6,34–36</sup> was assessed

using the four subscales of the SF-36 that aggregate to mental health (vitality, social functioning, role limitations due to emotional problems, and mental health). These validated scales are scored from 0–100, with higher scores indicating better health-related quality of life.

Gynecological histories examined included previous oral contraceptive use,<sup>37</sup> a history of gynecological cancer,<sup>38</sup> a history of hysterectomy,<sup>39</sup> and increasing parity.<sup>40</sup> Medications selected for examination included selective serotonin-reuptake inhibitor (SSRI)<sup>41,42</sup> use, determined from a pharmacy database [Master Drug Data Base (MDDB): Medi-Span, Indianapolis, IN],<sup>43,44</sup> and hormone therapy use.<sup>45</sup> Health behaviors, including exercise,<sup>46</sup> smoking,<sup>24</sup> body mass index (BMI),<sup>26,47</sup> and alcohol use<sup>48,49</sup>, were also assessed.

**Table 1. Demographics by Sexual Satisfaction Status-The Women’s Health Initiative - Observational Study**

	Satisfied sexually (N=35,719)	Not satisfied sexually (N=10,806)	
Sociodemographic variable	N (%)	N (%)	P-Value
Age (years)			
50–59	14,741 (75)	4,906 (25)	<.0001
60–69	15,673 (78)	4,513 (22)	
70–79	5,305 (79)	1,387 (21)	
Marital status			
Never married	345 (68)	161 (32)	<.0001
Divorced/separated	2,632 (67)	1,295 (33)	
Widowed	1,508 (72)	580 (28)	
Married/partnered	31,083 (78)	8,720 (22)	
Family income			
<\$10,000	540 (70)	227 (30)	<.0001
\$10,000–19,999	1,781 (73)	647 (37)	
\$20,000–34,999	5,789 (75)	1,931 (25)	
\$35,000–49,999	6,782 (77)	2,061 (23)	
\$50,000–74,999	8,221 (77)	2,476 (23)	
\$75,000+	10,191 (79)	2,782 (21)	
Don’t know	895 (76)	281 (24)	
Race/ethnicity			
American Indian	142 (83)	29 (17)	<.0001
Asian/Pacific Islander	1,001 (85)	183 (16)	
Black/African American	2,269 (75)	776 (26)	
Hispanic	1,252 (77)	385 (24)	
White	30,629 (77)	9,325 (23)	0.02
Unknown	347 (80)	87 (20)	
Education			
0–8 years	338 (77)	104 (24)	
Some high school	887 (75)	291 (25)	0.03
HS diploma/GED	5,476 (77)	1,603 (23)	
School after HS	12,658 (76)	4,002 (24)	
College degree or higher	16,092 (77)	4,726 (23)	
Employment status			
Technical/sales/admin	9,680 (76)	3,010 (24)	0.10
Service/labor	2,684 (77)	823 (24)	
Homemaker	6,934 (78)	1,953 (22)	
Managerial/professional	13,015 (77)	3,993 (24)	
Other	1,926 (76)	604 (24)	0.10
Sexual orientation			
Heterosexual	34,771 (77)	10,497 (23)	
Bisexual	248 (71)	103 (29)	
Lifetime lesbian	91 (77)	28 (24)	
Adult lesbian	116 (75)	39 (25)	
Never had sex	26 (72)	10 (28)	
Prefer not to respond	312 (79)	83 (21)	

We hypothesized that a model developed from these variables could accurately discriminate between the sexually satisfied and dissatisfied participants.

## Statistical Analysis

Before creating a dichotomous outcome variable for sexual satisfaction, we verified that the extreme responses to the sexual satisfaction question (responses 1 and 4) reflected similar direction with greater magnitude when compared to their nearest respective middle range responses (responses 2 and 3). We then created a binary response variable (sexually satisfied versus unsatisfied.)

For bivariate analyses, we used t-tests for continuous variables and chi-squared tests for categorical variables, with  $\alpha=0.05$  to determine statistical significance. To assess the clinical significance of reported differences in continuous variables, we calculated an effect size, measured as the absolute value of the differences between the mean scores of those satisfied and not satisfied women divided by the standard deviation of the reference group (satisfied).<sup>50</sup> We use previously established guidelines for effect size<sup>51</sup> to describe clinical significance.

In order to test how robustly each group of variables independently discriminated between sexually satisfied and unsatisfied subjects, we created sequential logistic regression models with block entry for each category (model 1: sociodemographic, model 2: adds physical health, model 3: adds mental health, model 4: adds gynecologic variables, model 5: adds medications, and model 6: adds health behaviors). We report c-statistics for each model. Variables that were not significant in bivariate analysis were excluded from these models.

To test the robustness of our models, backwards and stepwise selection procedures were utilized, with both 0.05 and 0.20 selected as entry and retention criteria, respectively. The variables in the final model were the same for stepwise and backward selection, confirming the robustness of the results.

## RESULTS

Fifty-two percent (48,300) of the respondents reported that they had been sexually active with another person in the past year. Of these, 96% (46,525) answered the sexual satisfaction question. Overall, 77% (35,719) reported satisfaction with sexual activity.

As shown in Table 1, sexual satisfaction was associated with increasing age and higher family income. Marital or partnered status was associated with sexual satisfaction, with more married or partnered participants reporting sexual satisfaction, versus all other participants. Identification with certain racial or ethnic groups was associated with sexual satisfaction. Other demographic variables showed statistically significant differences, but a small absolute difference. Sexual orientation was not associated with sexual satisfaction.

To ensure that the race and age findings were not an artifact of non-response bias, all non-responders were categorized as not satisfied. There was little change in the results among the groups identifying as American Indian or Asian. Similarly, when non-responders were categorized as not satisfied by age, the results were attenuated, but consistent in direction with the results reported in Table 1. Thus, differential non-response by either race or age did not account for our findings.

Table 2 shows the SF-36 subscales relating to physical and mental health. Among the physical health subscales, the effect sizes range from 0.09 to 0.14, a clinical difference that is insignificant. For the mental health subscales, the effect sizes range from 0.21 to 0.38. These differences are small but clinically meaningful.

Table 3 lists the gynecologic variables, medications, and health behaviors selected for investigation. Subjects with a history of oral contraceptive use were less likely to report sexual satisfaction, but this difference was small (76% versus 78%). Sexual satisfaction was equally proportional among participants reporting a history of gynecological cancer and those who did not. There was little difference in satisfaction among subjects reporting a history of hysterectomy (76%) compared to those who had never had a hysterectomy (77%). With respect to parity, our results were statistically significant, but we did not find a clear linear trend, threshold effect, or a j- or u-shaped relationship between parity and sexual satisfaction.

SSRI users were less likely to report sexual satisfaction than nonusers (66% versus 77%). Hormone therapy users and nonusers were equally likely to report sexual satisfaction. Satisfaction with sexual activity was associated with more exercise, never smoking, and normal body mass index (BMI). Alcohol users and nonusers reported equal rates of satisfaction.

Table 4 shows the results of sequential models with independent variables examined for association with sexual satisfaction. Model 1 includes demographics only and yields a c-statistic of 0.559, reflecting a limited ability to discriminate between satisfied and dissatisfied participants. In model 2, the

**Table 2. Physical and Mental Health-Related Quality of Life by Sexual Satisfaction Status – The Women's Health Initiative – Observational Study**

	Satisfied sexually (N=35,719)	Not satisfied sexually (N=10,806)	P-Value	Effect size
	Mean (SD)	Mean (SD)		
<b>Physical health subscales</b>				
Physical functioning	85.02 (17.65)	83.47 (18.67)	<.0001	0.09
Role limitations due to physical health	77.54 (33.83)	73.54 (35.78)	<.0001	0.12
Bodily pain	76.63 (22.02)	73.77 (23.50)	<.0001	0.13
General health	76.32 (17.26)	73.95 (18.60)	<.0001	0.14
<b>Mental health subscales</b>				
Vitality	66.56 (17.98)	62.14 (20.06)	<.0001	0.25
Social functioning	91.66 (16.14)	88.19 (19.41)	<.0001	0.21
Role limitations due to emotional health	87.75 (26.40)	81.06 (31.78)	<.0001	0.25
Mental health	80.95 (12.87)	76.10 (15.91)	<.0001	0.38

\*SD = Standard deviation

**Table 3. Gynecologic Variables, Medications and Health Behaviors by Sexual Satisfaction Status – The Women's Health Initiative – Observational Study**

	Satisfied sexually (N=35,719)	Not satisfied sexually (N=10,806)	P-Value
	N (%)	N (%)	
<b>Gynecological variables</b>			
Oral contraceptive use ever			<.0001
Yes	16,964 (76)	5,447 (24)	
No	18,755 (78)	5,359 (22)	
History of gynecological cancer			0.11
Yes	1,021 (75)	341 (25)	
No	34,465 (77)	10,390 (23)	
History of hysterectomy			0.01
Yes	14,913 (76)	4,659 (24)	
No	20,768 (77)	6,135 (23)	
Parity			<.0001
Never pregnant	2,183 (77)	641 (23)	
Never had a term pregnancy	775 (72)	307 (28)	
1	2,935 (76)	928 (24)	
2	10,177 (77)	3,105 (23)	
3	9,451 (77)	2,801 (23)	
4	5,551 (78)	1,549 (22)	
5+	4,458 (76)	1,398 (24)	
<b>Medications</b>			
Selective serotonin reuptake inhibitor use			<.0001
Yes	1,111 (66)	578 (34)	
No	34,607 (77)	10,228 (23)	
Hormone therapy use			0.13
Yes	15,572 (76)	4,800 (24)	
No	20,146 (77)	6,006 (23)	
<b>Health behaviors</b>			
Exercise			<.0001
No activity	3,848 (74)	1,360 (26)	
Some activity	12,394 (77)	3,774 (23)	
2 to <4 episodes per week	6,974 (77)	2,079 (23)	
≥4 episodes per week	12,193 (78)	3,516 (22)	
Smoking			<.0001
Never smoked	18,897 (78)	5,208 (22)	
Past smoker	14,616 (75)	4,813 (25)	
Current smoker	1,825 (74)	654 (26)	
Body mass index			<.001
<18.5 Underweight	349 (74)	122 (26)	
18.5–24.9 Normal	15,583 (77)	4,565 (23)	
25.0–24.9 Overweight	12,096 (77)	3,657 (23)	
≥30 Obesity	7,301 (76)	2,343 (24)	
Alcohol use			0.54
Yes	25,341 (76)	7,880 (24)	
No	6,246 (77)	1,908 (23)	

general health and pain constructs of the SF-36 met our model retention criteria. With addition of the mental health subscales in model 3, the physical health subscales were excluded, and the mental health and vitality constructs were retained. In model 4, adding gynecologic variables, parity and oral contraceptive use were retained. In model 5, SSRI use was retained. In model 6, smoking status was retained. With each sequential model, the c-statistic improves only modestly, to a final c-statistic of 0.613, reflecting a limited ability to discriminate between women who report sexual satisfaction and those that do not.

In model 6, among the demographic variables, the strongest association with sexual satisfaction was found with race or ethnicity. American Indians or Alaskan Natives were 2.7 times more likely to be sexually satisfied than whites, followed by Asian (OR=1.5) and Hispanic (OR=1.1) respondents. Being married or partnered was significantly associated with sexual satisfaction, compared to all other participants. The oldest age cohort, 70–79, had greater odds of satisfaction, compared to the younger cohorts.

Among the SF-36 subscales, two scales associated with mental health were retained, with greater odds of sexual satisfaction associated with greater mental health (OR=1.3) and greater vitality (OR=1.1). Certain parous states were associated with sexual satisfaction. No prior use of oral contraceptives was associated with greater odds of sexual satisfaction (OR=1.1), as was no SSRI use (OR=1.4). Former smokers were less likely to report satisfaction (OR=0.8) versus never smokers.

Despite excluding subjects who had not had sex with a partner in the past year, satisfaction with sexual frequency could confound the overall sexual satisfaction construct. In bivariate analysis, satisfaction with sexual frequency was highly associated ( $p<.0001$ ) with satisfaction with sexual activity. Participants who would like sex less often, more often, and who preferred not to answer were more likely to be sexually dissatisfied than participants who were satisfied with current sexual frequency.

To test whether satisfaction with sexual frequency confounded our overall results with respect to sexual satisfaction, we reran model 6 including satisfaction with sexual frequency. All variables in the model were the same as the variables in Table 3, except for age and oral contraceptive use, which no longer met our retention criterion, and satisfaction with sexual frequency, which met our retention criterion and was therefore included.

Because this could indicate that age may function as a surrogate for satisfaction with sexual frequency, we assessed the bivariate association between age and satisfaction with sexual frequency. Among dissatisfied participants, a higher proportion of women aged 50–59 would like sex more often than women aged 70–79 (35% versus 20%), and a higher proportion of women aged 70–79 would like sex less often than women aged 50–59 (6% versus 5%).

## DISCUSSION

Postmenopausal women in the Women's Health Initiative Observation Cohort reported sexual satisfaction if they were older, married or partnered, emotionally healthier, not taking SSRIs, and never smokers. Sexual satisfaction was also associated with identification with certain racial or ethnic groups and showed a complex relationship with parity. While many of these factors are not modifiable, several, including mental health status and SSRI use, are amenable to primary care intervention. After inclusion of all of the variables, among postmenopausal women who had sex with a partner in the past year, our final model had limited predictive ability. This reflects the complexity of the satisfaction construct, residual confounding, and unmeasured variables.

Our age findings were unexpected. Previous studies describe increasing incidence of dyspareunia with aging, thought to be a strong correlate of sexual dissatisfaction.<sup>5,6,52</sup> However,



Table 4. Odds of Satisfaction with Sexual Activity Among Sexually Active Postmenopausal Women–The Women’s Health Initiative–observational study

Model	Variable	Estimate (95% CI)	P-Value	C-Statistic	Change in c-statistic
Model 1: Demographics only	Age		<.0001	0.559	–
	50–59	0.723 (0.649, 0.805)			
	60–69	0.844 (0.761, 0.936)			
	70–79	1.00			
	Race/ethnicity		0.0035		
	American Indian or Alaskan Native	2.105 (1.037, 4.272)			
	Asian or Pacific Islander	1.707 (1.266, 2.300)			
	Black or African-American	1.037 (0.893, 1.203)			
	Hispanic/Latino	1.079 (0.882, 1.319)			
	Other	1.170 (0.810, 1.690)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.614 (0.546, 0.691)			
	Never married	0.521 (0.388, 0.700)			
	Widowed	0.739 (0.630, 0.867)			
	Married/partnered	1.00			
	Family income		0.0405		
	\$10,000–19,999	0.953 (0.711, 1.276)			
	\$20,000–34,999	0.956 (0.727, 1.256)			
	\$35,000–49,999	1.086 (0.825, 1.428)			
	\$50,000–74,999	1.033 (0.786, 1.358)			
	\$75,000+	1.113 (0.845, 1.465)			
	Don’t know	0.888 (0.637, 1.239)			
	<\$10,000	1.00			
Model 2: Demographics and physical health	Age		<.0001	0.574	0.015
	50–59	0.732 (0.658, 0.813)			
	60–69	0.842 (0.759, 0.934)			
	70–79	1.00			
	Race/ethnicity		0.0029		
	American Indian or Alaskan Native	2.329 (1.145, 4.739)			
	Asian or Pacific Islander	1.640 (1.217, 2.211)			
	Black or African-American	1.083 (0.932, 1.260)			
	Hispanic/Latino	1.099 (0.898, 1.345)			
	Other	1.185 (0.816, 1.719)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.587 (0.524, 0.657)			
	Never married	0.487 (0.363, 0.655)			
	Widowed	0.709 (0.606, 0.830)			
	Married/partnered	1.00			
	General health	1.114 (1.073, 1.156)	<.0001		
	Bodily pain	1.076 (1.037, 1.117)	0.0001		
	Age		0.0004	0.605	0.031
	50–59	0.805 (0.723, 0.896)			
	60–69	0.863 (0.777, 0.959)			
	70–79	1.00			
	Race/ethnicity		0.0020		
	American Indian or Alaskan Native	2.711 (1.279, 5.745)			
	Asian or Pacific Islander	1.607 (1.189, 2.171)			
	Black or African-American	1.034 (0.888, 1.203)			
	Hispanic/Latino	1.150 (0.937, 1.411)			
	Other	1.236 (0.845, 1.808)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.621 (0.554, 0.696)			
	Never married	0.514 (0.381, 0.692)			
	Widowed	0.764 (0.651, 0.896)			
	Married/partnered	1.00			
	Mental health	1.304 (1.255, 1.355)	<.0001		
	Vitality	1.083 (1.042, 1.127)	<.0001		

(continued on next page)

Table 4. (continued)

Model	Variable	Estimate (95% CI)	P-Value	C-Statistic	Change in c-statistic
Model 4: Demographics, physical health, mental health and gynecologic variables	Age		0.0098	0.608	0.003
	50–59	0.839 (0.749, 0.940)			
	60–69	0.883 (0.794, 0.982)			
	70–79	1.00			
	Race/ethnicity		0.0025		
	American Indian or Alaskan Native	2.705 (1.275, 5.740)			
	Asian or Pacific Islander	1.596 (1.181, 2.157)			
	Black or African-American	1.027 (0.881, 1.196)			
	Hispanic/Latino	1.150 (0.937, 1.412)			
	Other	1.222 (0.835, 1.787)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.623 (0.555, 0.698)			
	Never married	0.477 (0.347, 0.655)			
	Widowed	0.759 (0.647, 0.890)			
	Married/partnered	1.00			
	Mental health	1.303 (1.254, 1.354)	<.0001		
	Vitality	1.083 (1.041, 1.126)	<.0001		
	Parity		0.0431		
	1	0.994 (0.823, 1.199)			
	2	0.860 (0.734, 1.008)			
	3	0.854 (0.728, 1.002)			
	4	0.920 (0.776, 1.091)			
	5+	0.824 (0.692, 0.980)			
	Never had term pregnancy	0.763 (0.593, 0.983)			
	Never pregnant	1.00			
	Oral contraceptive use ever		0.0044		
	No	1.109 (1.033, 1.191)			
	Yes	1.00			
Model 5: Demographics, physical health, mental health, gynecologic variables, and medications	Age		0.0136	0.610	0.002
	50–59	0.844 (0.754, 0.945)			
	60–69	0.885 (0.796, 0.984)			
	70–79	1.00			
	Race/ethnicity		0.0032		
	American Indian or Alaskan Native	2.710 (1.277, 5.749)			
	Asian or Pacific Islander	1.580 (1.169, 2.135)			
	Black or African-American	1.019 (0.875, 1.187)			
	Hispanic/Latino	1.143 (0.931, 1.403)			
	Other	1.214 (0.830, 1.775)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.624 (0.556, 0.700)			
	Never married	0.478 (0.348, 0.656)			
	Widowed	0.759 (0.647, 0.891)			
	Married/partnered	1.00			
	Mental health	1.297 (1.249, 1.348)	<.0001		
	Vitality	1.074 (1.033, 1.117)	0.0004		
	Parity		0.0442		
	1	0.987 (0.818, 1.191)			
	2	0.857 (0.731, 1.004)			
	3	0.851 (0.725, 0.998)			
	4	0.915 (0.772, 1.086)			
	5+	0.818 (0.687, 0.973)			
	Never had term pregnancy	0.766 (0.594, 0.987)			
	Never pregnant	1.00			
	Oral contraceptive use ever		0.0054		
	No	1.106 (1.030, 1.188)			
	Yes	1.00			
	Selective serotonin reuptake inhibitor use		<.0001		
	No	1.381 (1.177, 1.620)			
	Yes	1.00			

(continued on next page)

Table 4. (continued)

Model	Variable	Estimate (95% CI)	P-Value	C-Statistic	Change in c-statistic
Model 6: Demographics, physical health, mental health, gynecologic variables, medications, behaviors	Age		0.0202	0.613	0.003
	50–59	0.851 (0.759, 0.953)			
	60–69	0.892 (0.802, 0.992)			
	70–79	1.00			
	Race/ethnicity		0.0068		
	American Indian or Alaskan Native	2.678 (1.262, 5.681)			
	Asian or Pacific Islander	1.524 (1.128, 2.061)			
	Black or African-American	1.011 (0.867, 1.178)			
	Hispanic/Latino	1.123 (0.915, 1.380)			
	Other	1.220 (0.834, 1.785)			
	White (not of Hispanic origin)	1.00			
	Marital status		<.0001		
	Divorced or separated	0.631 (0.563, 0.708)			
	Never married	0.485 (0.353, 0.666)			
	Widowed	0.766 (0.653, 0.899)			
	Married/partnered	1.00			
	Mental health	1.292 (1.243, 1.343)	<.0001		
	Vitality	1.079 (1.038, 1.123)	0.0002		
	Parity		0.0402		
	1	0.988 (0.819, 1.192)			
	2	0.854 (0.729, 1.002)			
	3	0.848 (0.723, 0.996)			
	4	0.910 (0.767, 1.080)			
	5+	0.811 (0.681, 0.966)			
	Never had term pregnancy	0.775 (0.601, 0.998)			
	Never pregnant	1.00			
	Oral contraceptive use ever		0.0107		
	No	1.097 (1.022, 1.179)			
	Yes	1.00			
	Selective serotonin reuptake inhibitor use		0.0001		
	No	1.369 (1.167, 1.607)			
	Yes	1.00			
	Smoking		<.0001		
	Current smoker	0.905 (0.778, 1.053)			
	Past smoker	0.834 (0.778, 0.894)			
	Never smoked	1.00			

many of these studies focused on premenopausal women, or compared premenopausal to postmenopausal women. Our cohort of postmenopausal women was likely more homogeneous with respect to hormonal milieu. Further research, including research on lubricant use among different ages of postmenopausal women, may better elaborate this association.

Additionally, sexually-related distress,<sup>14</sup> and anxiety about sexual performance<sup>6</sup> and attractiveness decrease with age.<sup>53</sup> As satisfaction may be impeded by anxiety over sexual performance or desirability, relative satisfaction may increase with age.

Selection bias may partially explain satisfaction with increasing age. All of the women in this analysis were healthy enough to have sexual activity with a partner in the past year. With increasing age, the presence of a sexual partner may be increasingly protective against dissatisfaction. Stability of partnered relationships is protective against sexual dysfunction.<sup>6</sup>

Decreased satisfaction in women with five or more births may reflect the late urogenital sequelae of pregnancy and delivery. Pelvic organ prolapse and urinary incontinence may be associated with increased parity,<sup>54–56</sup> and may result in decreased sexual satisfaction. However, those who had conceived but never carried to term were least likely to report sexual satisfaction. Although this may reflect long-standing sequelae of pelvic disease or endocrinopathies that can interfere with gestation, it is unclear that this would remain

associated with sexual satisfaction after menopause. This finding deserves further investigation.

None of the SF-36 subscales that aggregate most strongly with physical health were retained in our final model. This result is discordant with other studies.<sup>6,57</sup> Of note, the vitality measure retained in our final model cross-correlates with the physical health aggregate. Additionally, health and sexuality are more strongly linked for men versus women.<sup>29</sup>

Mental health was a strong predictor of lower satisfaction with sexual activity, in this study and others.<sup>6,57</sup> Because the WHI-OS excluded women with major depression or mental health disorders, enrolling overall healthy women,<sup>18</sup> the range of mental health symptoms may be mild compared to population-based data. Controlling for mental health status, SSRI use remained a strong correlate of decreased sexual satisfaction. Women may have more severe SSRI sexual side effects, including orgasm delay, than men.<sup>41</sup> In preliminary work, we controlled specifically for depressive symptoms and found a similar relationship with SSRI use.

Our findings with respect to use of oral contraceptives were surprising. Detrimental effects of oral contraceptives on sexual functioning may be sustained after discontinuation of the medications.<sup>37</sup> However, removal of this variable from the final model with addition of the sexual frequency construct suggests this finding lacks robustness.

There was no difference between current and never smokers in sexual satisfaction. Among former smokers we found a modest but statistically significant decrement in sexual satisfaction. We explored whether this finding reflected a “healthy smoker” effect, in which individuals who take up and persist in smoking are relatively resistant to the adverse health effects of smoking.<sup>58</sup> The mean overall health scores of former smokers (76.3) was higher than that of current smokers (72.5,  $p < .0001$ ). Thus, this finding may reflect type I error.

Despite previous randomized controlled trials showing estrogen therapy effects on sexual satisfaction,<sup>59</sup> hormone therapy did not have a significant impact on sexual satisfaction. Confounding by indication suggests that women with sexual dissatisfaction due to atrophic vaginitis may take exogenous estrogen. Conversely, women not on exogenous estrogen are less likely to have atrophic vaginitis.

Our study included only those women who reported partnered sexual activity. This sampling scheme excluded women who may have been sexually active, but were not sexually active with another person. Although sexual satisfaction is not dependent upon the presence of a partner, this exclusion was necessary to decrease confounding of our satisfaction construct by lack of a sexual partner.<sup>6</sup> Additionally, it isolated those who were sexually active and satisfied versus those who were not sexually active, but remained satisfied. The relative importance of sex decreases among older women,<sup>14</sup> and sexual interest and desire decrease after menopause.<sup>9,60,61</sup> Thus, respondents who had no sexual activity may have been very satisfied. Examination of sexual satisfaction among unpartnered women was beyond the scope of this study.

This study has several strengths. The Women’s Health Initiative is a large cohort and has good representation of women across geographic, racial, and ethnic groups. This is the first study to describe the correlates of sexual satisfaction among postmenopausal women and to examine the individual subscales of the SF-36 in relation to sexual satisfaction.

An important limitation of this work is that the sexual satisfaction construct has not been validated. Of note, the question has strong face validity and similar wording to questions on validated instruments. Additionally, longitudinal data on sexual satisfaction were not available. Thus, changes in associations over time could not be described, nor could baseline factors that might predict change in sexual satisfaction. Further, we cannot exclude the possibility that secular trends in the correlates of sexual satisfaction exist, and that younger cohorts may report a different set of correlates once they reach menopause.

Despite our exclusion of those without sex with a partner in the last year, subjects could answer the satisfaction question based on quantity of sex. A sensitivity analysis that included satisfaction with sexual frequency found that satisfaction with sexual frequency replaced age in multivariate analysis, suggesting the centrality of sexual frequency to sexual satisfaction. Further research should better correlate sexual frequency with sexual satisfaction among postmenopausal women.

## CONCLUSIONS

Satisfaction with sexual activity among postmenopausal women was associated with demographic and historical factors that are not amenable to physician intervention. However, it is also

associated with potentially modifiable factors, including self-reported mental health status and SSRI use. These results should be interpreted with caution, as the final model had limited ability to discriminate between the satisfied and dissatisfied participants. Further research may better elaborate the cofactors associated with sexual satisfaction among postmenopausal women.

---

**Acknowledgements: Funding/Support:** The Women’s Health Initiative program was funded by the National Heart, Lung, and Blood Institute of the National Institutes of Health, US Department of Health and Human Services. Dr. McCall-Hosenfeld was supported by a Department of Veterans Affairs Special Fellowship in the Health Issues of Women Veterans when this research was performed.

**Role of the Sponsor:** The funding organization had representation on the steering committee, which governed the design and conduct of the study, the interpretation of the data, and the preparation and approval of manuscript. The National Heart, Lung, and Blood Institute Program Office reviewed the manuscript prior to publication.

**WHI Investigators by Clinical Center: Program Office:** (National Heart, Lung, and Blood Institute, Bethesda, MD) Elizabeth Nabel, Jacques Rossouw, Shari Ludlam, Linda Pottern, Joan McGowan, Leslie Ford, and Nancy Geller.

**Clinical Coordinating Center:** (Fred Hutchinson Cancer Research Center, Seattle, WA)

Ross Prentice, Garnet Anderson, Andrea LaCroix, Charles L. Kooperberg, Ruth E. Patterson, Anne McTiernan; (Wake Forest University School of Medicine, Winston-Salem, NC) Sally Shumaker; (Medical Research Labs, Highland Heights, KY) Evan Stein; (University of California at San Francisco, San Francisco, CA) Steven Cummings.

**Clinical Centers:** (Albert Einstein College of Medicine, Bronx, NY) Sylvia Wassertheil-Smoller; (Baylor College of Medicine, Houston, TX) Aleksandar Rajkovic; (Brigham and Women’s Hospital, Harvard Medical School, Boston, MA) JoAnn Manson; (Brown University, Providence, RI) Annlouise R. Assaf; (Emory University, Atlanta, GA) Lawrence Phillips; (Fred Hutchinson Cancer Research Center, Seattle, WA) Shirley Beresford; (George Washington University Medical Center, Washington, DC) Judith Hsia; (Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Torrance, CA) Rowan Chlebowski; (Kaiser Permanente Center for Health Research, Portland, OR) Evelyn Whitlock; (Kaiser Permanente Division of Research, Oakland, CA) Bette Caan; (Medical College of Wisconsin, Milwaukee, WI) Jane Morley Kotchen; (MedStar Research Institute/Howard University, Washington, DC) Barbara V. Howard; (Northwestern University, Chicago/Evanston, IL) Linda Van Horn; (Rush Medical Center, Chicago, IL) Henry Black; (Stanford Prevention Research Center, Stanford, CA) Marcia L. Stefanick; (State University of New York at Stony Brook, Stony Brook, NY) Dorothy Lane; (The Ohio State University, Columbus, OH) Rebecca Jackson; (University of Alabama at Birmingham, Birmingham, AL) Cora E. Lewis; (University of Arizona, Tucson/Phoenix, AZ) Tamsen Bassford; (University at Buffalo, Buffalo, NY) Jean Wactawski-Wende; (University of California at Davis, Sacramento, CA) John Robbins; (University of California at Irvine, CA) F. Allan Hubbell; (University of California at Los Angeles, Los Angeles, CA) Lauren Nathan; (University of California at San Diego, LaJolla/Chula Vista, CA) Robert D. Langer; (University of Cincinnati, Cincinnati, OH) Margery Gass; (University of Florida, Gainesville/Jacksonville, FL) Marian Limacher; (University of Hawaii, Honolulu, HI) David Curb; (University of Iowa, Iowa City/Davenport, IA) Robert Wallace; (University of Massachusetts/Fallon Clinic, Worcester, MA) Judith Ockene; (University of Medicine and Dentistry of New Jersey, Newark, NJ) Norman Lasser; (University of Miami, Miami, FL) Mary Jo O’Sullivan; (University of Minnesota, Minneapolis, MN) Karen Margolis; (University of Nevada, Reno, NV) Robert Brunner; (University of North Carolina, Chapel Hill, NC) Gerardo Heiss; (University of Pittsburgh, Pittsburgh, PA) Lewis Kuller; (University of Tennessee, Memphis, TN) Karen C. Johnson; (University of Texas Health Science



Center, San Antonio, TX) Robert Brzyski; (University of Wisconsin, Madison, WI) Gloria E. Sarto; (Wake Forest University School of Medicine, Winston-Salem, NC) Mara Vitolins; (Wayne State University School of Medicine/Hutzel Hospital, Detroit, MI) Susan Hendrix.

**Conflict of Interest:** None disclosed.

**Corresponding Author:** Jennifer S. McCall-Hosenfeld, MD, MSc; Division of General Internal Medicine and Department of Public Health Sciences, Pennsylvania State University College of Medicine, Hershey, PA, USA (e-mail: jsm31@psu.edu).

## REFERENCES

- Rosen, R, Brown C, Heiman J, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther.* 2000;26(2):191-208.
- Rosen, RC, Lobo RA, Block BA, Yang H-M, Zipfel LM. Menopausal Sexual Interest Questionnaire (MSIQ): a unidimensional scale for the assessment of sexual interest in postmenopausal women. *J Sex Marital Ther.* 2004;30(4):235-50.
- Rust, J, Golombok S. The GRISS: A Psychometric Instrument for the Assessment of Sexual Dysfunction. *Arch Sex Behav.* 1986;15(2):157-65.
- Nicolosi, A, Laumann EO, Glasser DB, et al. Sexual behavior and sexual dysfunctions after age 40: the global study of sexual attitudes and behaviors. *Urology.* 2004;64(5):991-7.
- Laumann, EO, Nicolosi A, Glasser DB, et al. Sexual problems among women and men aged 40-80 y: prevalence and correlates identified in the Global Study of Sexual Attitudes and Behaviors. *Int J Impot Res.* 2005;17(1):39-57.
- Laumann, EO, Paik A, Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. *JAMA.* 1999;281(6):537-44.
- Salonia, A, Munarriz RM, Naspro R, et al. Women's sexual dysfunction: a pathophysiological review. *BJU Int.* 2004;93(8):1156-64.
- Nazareth, I, Boynton P, King M. Problems with sexual function in people attending London general practitioners: cross sectional study. *BMJ.* 2003;327(7412):423.
- Dennerstein, L, Smith A, Morse C. Sexuality and the menopause. *J Psychosomatic Obstet Gynecol.* 1994;15:59-66.
- Maas, CP, Weijenborg PTM, ter Kuile MM. The effect of hysterectomy on sexual functioning. *Annu Rev Sex Res.* 2003;14:83-113.
- Dennerstein, L, Koochaki P, Barton I, Graziottin A. Hypoactive sexual desire disorder in menopausal women: a survey of Western European women. *J Sex Med.* 2006;3(2):212-22.
- Dennerstein, L, Leher P. Modeling mid-aged women's sexual functioning: a prospective, population-based study. *J Sex Marital Ther.* 2004;30(3):173-83.
- Dennerstein, L, Hayes RD. Confronting the challenges: epidemiological study of female sexual dysfunction and the menopause. *J Sex Med.* 2005;2(Suppl 3):118-32.
- Hayes, R, Dennerstein L. The impact of aging on sexual function and sexual dysfunction in women: a review of population-based studies. *J Sex Med.* 2005;2(3):317-30.
- Cain, VS, Johannes CB, Avis NE, et al. Sexual functioning and practices in a multi-ethnic study of midlife women: baseline results from SWAN. *J Sex Res.* 2003;40(3):266-76.
- Howard, BV, Kuller L, Langer R, et al. Risk of cardiovascular disease by hysterectomy status, with and without oophorectomy: the Women's Health Initiative Observational Study. *Circulation.* 2005;111(12):1462-70.
- Hsia, J, Aragaki A, Bloch M, LaCroix AZ, Wallace R, Investigators WHI. Predictors of angina pectoris versus myocardial infarction from the Women's Health Initiative Observational Study. *Am J Cardiol.* 2004;93(6):673-8.
- Langer, RD, White E, Lewis CE, Kotchen JM, Hendrix SL, Trevisan M. The Women's Health Initiative Observational Study: baseline characteristics of participants and reliability of baseline measures. *Ann Epidemiol.* 2003;13(9 Suppl):S107-21.
- Hays, J, Hunt JR, Hubbell FA, et al. The Women's Health Initiative recruitment methods and results. *Ann Epidemiol.* 2003;13(9 Suppl):S18-77.
- Stefanick, ML, Cochrane BB, Hsia J, Barad DH, Liu JH, Johnson SR. The Women's Health Initiative postmenopausal hormone trials: overview and baseline characteristics of participants. *Ann Epidemiol.* 2003;13(9 Suppl):S78-86.
- Valanis, BG, Bowen DJ, Bassford T, Whitlock E, Charney P, Carter RA. Sexual orientation and health: comparisons in the women's health initiative sample. *Arch Fam Med.* 2000;9(9):843-53.
- Brunner RL, Gass M, Aragaki A, et al. Effects of conjugated equine estrogen on health-related quality of life in postmenopausal women with hysterectomy: results from the Women's Health Initiative Randomized Clinical Trial. *Arch Intern Med.* 2005;197:6-86.
- Hays, J, Ockene JK, Brunner RL, et al. Effects of estrogen plus progestin on health-related quality of life. *N Engl J Med.* 2003;348(19):1839-54.
- Oksuz, E, Malhan S, Oksuz E, Malhan S. Prevalence and risk factors for female sexual dysfunction in Turkish women. *J Urol.* 2006;175(2):654-8.
- Lewis, RW, Fugl-Meyer KS, Bosch R, et al. Epidemiology/risk factors of sexual dysfunction. *J Sex Med.* 2004;1(1):35-9.
- Addis, IB, Ireland CC, Vittinghoff E, Lin F, Stuenkel CA, Hulley S. Sexual activity and function in postmenopausal women with heart disease. *Obstet Gynecol.* 2005;106(1):121-7.
- Henderson AW, Lehavot K, Simoni JM. Ecological Models of Sexual Satisfaction among Lesbian/Bisexual and Heterosexual Women. *Arch Sex Behav.* 2008.
- Tracy, JK, Junginger J. Correlates of lesbian sexual functioning. *J Women's Health.* 2007;16(4):499-509.
- Lindau, ST, Schumm LP, Laumann EO, Levinson W, O'Muircheartaigh CA, Waite LJ. A study of sexuality and health among older adults in the United States. *N Engl J Med.* 2007;357(8):762-74.
- Basson, R, Schultz WW. Sexual sequelae of general medical disorders. *Lancet.* 2007;369(9559):409-24.
- Nappi, R, Salonia A, Traish AM, et al. Clinical biologic pathophysiology of women's sexual dysfunction. *J Sex Med.* 2005;2(1):4-25.
- Ware, J, Sherbourne C. The MOS 36-Item Short-Form Health Survey (SF-36). I: conceptual framework and item selection. *Medical Care.* 1992;30:473-83.
- Hays, R, Sherbourne C, Mazel R. The RAND 36-Item Health Survey 1.0. *Health Econ.* 1993;2(3):213-5.
- Bartlik, B, Kocsis JH, Legere R, et al. Sexual dysfunction secondary to depressive disorders. *J Gend Specif Med.* 1999;2(2):52-60.
- Kennedy, SH, Dickens SE, Eisefeld BS, et al. Sexual dysfunction before antidepressant therapy in major depression. *J Affect Disord.* 1999;56(2-3):201-8.
- Dobkin, RD, Leiblum SR, Rosen RC, et al. Depression and sexual functioning in minority women: current status and future directions. *J Sex Marital Ther.* 2006;32(1):23-36.
- Panzer, C, Wise S, Fantini G, et al. Impact of oral contraceptives on sex hormone-binding globulin and androgen levels: a retrospective study in women with sexual dysfunction. *J Sex Med.* 2006;3(1):104-13.
- Andersen, BL, Woods XA, Copeland LJ. Sexual self-schema and sexual morbidity among gynecologic cancer survivors. *J Consult Clin Psychol.* 1997;65(2):221-9.
- Pieterse, GD, Maas CP, ter Kuile MM, et al. An observational longitudinal study to evaluate miction, defecation, and sexual function after radical hysterectomy with pelvic lymphadenectomy for early-stage cervical cancer. *Int J Gynecol Cancer.* 2006;16(3):1119-29.
- Botros, SM, Abramov Y, Miller J-JR, et al. Effect of parity on sexual function: an identical twin study. *Obstet Gynecol.* 2006;107(4):765-70.
- Hensley, PL, Nurnberg HG. SSRI sexual dysfunction: a female perspective. *J Sex Marital Ther.* 2002;28(Suppl 1):143-53.
- Rosen, RC, Lane RM, Menza M. Effects of SSRIs on sexual function: a critical review. *J Clin Psychopharmacol.* 1999;19(1):67-85.
- Wassertheil-Smoller, S, Shumaker S, Ockene J, et al. Depression and cardiovascular sequelae in postmenopausal women. The Women's Health Initiative (WHI). *Arch Intern Med.* 2004;164(3):289-98.
- Anderson, GL, Manson J, Wallace R, et al. Implementation of the Women's Health Initiative study design. *Ann Epidemiol.* 2003;13(9 Suppl):S5-17.
- Davison, SL, Bell RJ, LaChina M, et al. Sexual function in well women: stratification by sexual satisfaction, hormone use, and menopause status. *J Sex Med.* 2008;5(5):1214-22.
- Meston, CM, Gorzalka BB, Meston CM, Gorzalka BB. Differential effects of sympathetic activation on sexual arousal in sexually dysfunctional and functional women. *J Abnorm Psychol.* 1996;105(4):582-91.
- Esposito, K, Ciotola M, Giugliano F, et al. Association of body weight with sexual function in women. *Int J Impot Res.* 2007;19(4):353-7.
- Covington, SS, Kohen J, Covington SS, Kohen J. Women, alcohol, and sexuality. *Adv Alcohol Subst Abuse.* 1984;4(1):41-56.
- Peterson, JS, Hartsock N, Lawson G, Peterson JS, Hartsock N, Lawson G. Sexual dissatisfaction of female alcoholics. *Psychol Rep.* 1984;55(3):744-6.

50. **Rosenthal R.** Parametric measures of effect size. In: Cooper H, Hedges LV, eds. *The handbook of research synthesis*. New York: Russell Sage Foundation; 1994:231-44.
51. **Cohen, J.** *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: L. Erlbaum; 1988.
52. **Kadri, N, McHichi Alami KH, McHakra Tahiri S.** Sexual dysfunction in women: population based epidemiological study. *Arch Womens Ment Health*. 2002;5(2):59-63.
53. **Richters, J, Grulich AE, de Visser RO, Smith AMA, Rissel CE.** Sex in Australia: autoerotic, esoteric and other sexual practices engaged in by a representative sample of adults. *Aust N Z J Public Health*. 2003;27(2):180-90.
54. **Ghetti, C, Gregory WT, Clark AL.** Risk factors for surgically managed pelvic organ prolapse and urinary incontinence. *Int J Gynaecol Obstet*. 2007;98(1):63-4.
55. **Connolly, TJ, Litman HJ, Tennstedt SL, Link CL, McKinlay JB.** The effect of mode of delivery, parity, and birth weight on risk of urinary incontinence. *Int Urogynecol J*. 2007;18(9):1033-42.
56. **Hendrix, SL, Clark A, Nygaard I, Aragaki A, Barnabei V, McTiernan A.** Pelvic organ prolapse in the Women's Health Initiative: gravity and gravidity. *Am J Obstet Gynecol*. 2002;186(6):1160-6.
57. **Heiman, JR.** Sexual dysfunction: overview of prevalence, etiological factors, and treatments. *J of Sex Res*. 2002;39(1):73-8.
58. **Becklake, M, Lalloo U.** The 'healthy smoker': a phenomenon of health selection? *Respiration*. 1990;57(3):137-44.
59. **Alexander, JL, Kotz K, Dennerstein L, Kutner SJ, Wallen K, Notelovitz M.** The effects of postmenopausal hormone therapies on female sexual functioning: a review of double-blind, randomized controlled trials. *Menopause*. 2004;11(6 Pt 2):749-65.
60. **Avis, NE, Stellato R, Crawford S, Johannes C, Longcope C.** Is there an association between menopause status and sexual functioning? *Menopause*. 2000;7(5):297-309.
61. **Avis, NE, Zhao X, Johannes CB, Ory M, Brockwell S, Greendale GA.** Correlates of sexual function among multi-ethnic middle-aged women: results from the Study of Women's Health Across the Nation (SWAN). *Menopause*. 2005;12(4):385-98.