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Sexual function in older women after oophorectomy

Elisabeth A. Erekson, MD, MPH¹, Deanna K. Martin, MPH¹, Kejia Zhu, BS², Maria M. Ciarleglio, PhD², Divya A. Patel, PhD¹, Marsha K. Guess, MD¹, and Elena S. Ratner, MD¹

¹Department of Obstetrics, Gynecology, and Reproductive Sciences at Yale University School of Medicine, New Haven, Connecticut

²Yale Center for Analytical Sciences at Yale University School of Public Health, New Haven, Connecticut

Abstract

Objective—To compare the sexual function of older women who had bilateral oophorectomy with older women who had retained their ovaries.

Study Design—This cross-sectional study involved analysis of 1,352 women ages 57 to 85 from the National Social Life, Health and Aging Project (NSHAP). Women with prior bilateral oophorectomy were compared with women who retained their ovaries. The primary outcome of interest was self-report of sexual ideation, chosen because having thoughts about sexual experiences is not prohibited by either a partner or a woman's own physical limitations.

Results—Three hundred fifty six (26%) women reported prior bilateral oophorectomy. Our analysis achieved 90% power to detect a difference of 10% in sexual ideation. No significant difference in the report of sexual ideation was found between women with prior bilateral oophorectomy and women who retained their ovaries (54.5%, 95% confidence interval (CI), [48.1, 60.9] vs. 49.9%, 95% CI [46.0, 53.8], $p = .227$), even after adjusting for current hormone therapy, age, education, and race (adjusted odds ratio 1.32, 95% CI [0.96, 1.81]).

Conclusion—Bilateral oophorectomy may not play a pivotal role in sexual ideation and function among older women.

Keywords

Aging; NSHAP; Oophorectomy; Ovarian retention; Sexual function

Introduction

Hysterectomy is the most commonly performed gynecologic surgical procedure with over 600,000 hysterectomies performed annually in the United States. (1, 2) The majority of hysterectomies are performed for benign indications. This leaves the choice to undergo concomitant prophylactic bilateral oophorectomy at the time of hysterectomy between a woman and her surgeon. Currently, 25 to 55% of benign hysterectomies are performed with concomitant elective oophorectomy. (3–5) Elective oophorectomy is offered to women to reduce the risk of future ovarian cancer and adnexal surgery. However, ovarian conservation has been demonstrated to increase overall life-expectancy and decrease coronary heart disease. (6–7)

Corresponding Author: Elisabeth A. EREKSON, MD, MPH, Yale University School of Medicine, Section of Urogynecology and Reconstructive Pelvic Surgery, 333 Cedar St, PO Box 208063, New Haven, CT 06519, Phone: (203) 737-4880 FAX: (203) 785-2909, elisabeth.erikson@yale.edu.

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Postmenopausal ovaries have been demonstrated to produce both testosterone and androstenedione that are peripherally converted to estrogens in adipose cells.(8) Postmenopausal women maintain serum testosterone levels even two to three decades after menopause.(9, 10) In postmenopausal women, removal of the postmenopausal ovaries generally results in a 50% decline in circulating androgen levels.(8, 11, 12) Serum androgens are believed to be important in the maintenance of libido and sexual function in postmenopausal women.(13) However, the impact of elective oophorectomy on sexual function, including ideation, partnerships, activity, frequency, attitudes, and problems in older women has not been well studied. The primary objective of this study is to compare sexual ideation and function of older women who underwent bilateral oophorectomy with older women who had retained their ovaries.

Materials and Methods

We performed a cross-section analysis of the 2005–06 National Social Life, Health, and Aging Project (NSHAP) dataset to examine the sexual function in older women.(14–16) The NSHAP survey was conducted to investigate sexuality in a nationally representative probability sample of community-dwelling older adults in the United States ages 57 to 85 years old. Adults were targeted for possible participation in the NSHAP study from a prior population based study.(17) A unique aspect of the NSHAP is adequate representation via oversampling of previously understudied minority populations (Black and Hispanic women) within the dataset.(17) The overall survey response rate was 75.5% with 3,322 adults participating in the NSHAP between July 2005 and March 2006. Information in the NSHAP was obtained from in-home interviews of trained professional interviewers in both English and Spanish with the using computer-assisted personal interview (CAPI) methods.(14) Data was collected by the National Opinion Research Center (NORC) through the University of Chicago and maintained by the Institute for Social Research (ISR) at the University of Michigan to ensure the quality of the dataset.(15) The current study is a secondary data base analysis focused solely on women without cancer with known oophorectomy status. Male participants (n=1,455, 43.8%) and women with a prior cancer diagnosis (n=198, 6%) were excluded from our analyses. This study was exempt from review by the Yale University Institutional Review Board at as it involves research of an existing dataset from a public source.

The purpose of this study was to compare sexual function of older women who reported prior bilateral oophorectomy with that of older women who had retained their ovaries. Women reporting no prior oophorectomy or unilateral procedure were considered as women who retained their ovaries. The primary outcome of interest was self-report of sexual ideation at least once monthly. We chose sexual ideation as our primary outcome because having thoughts about sexual experiences should not be affected by either the woman's own physical limitations or partner's issues (lack of partner or partner's physical limitations). Because sexual function is known to change with age, women were stratified into the age categories of t: 57–64 years, 65–74 years, and 75–85 years old to obtain percentage estimates and 95% confidence intervals(CI).(16–18) Finally, we examined the difference between women who underwent oophorectomy prior to self-reported menopause and women who underwent oophorectomy after menopause.

Secondary outcomes included current sexual partnerships, sexual frequency within the last 12 months, types of sexual activities, sexual attitudes, and sexual problems. A *current partner* was defined as the subject reporting being currently married, cohabitating, or having an intimate partner. Women reporting no current sexual partner were not asked questions on sexual frequency or types of sexual activity (except for masturbation). *Sexual frequency* included the participation any sexual activity within the last 12 months. Sex was defined as

“any mutually voluntary activity with another person that involves sexual contact, whether or not intercourse or orgasm occurs.” *Types of sexual activity* reported including foreplay, vaginal coitus, receiving or giving oral sex, and masturbation. All women were asked questions on their own *sexual attitudes*, values, and beliefs. For women reporting a current sexual partner, women were asked about *sexual problems* including interest, lubrication, anorgasmia, dyspareunia, and avoidance of sexual activity due to problems.

Statistical analyses, including descriptive and inferential statistics with percentage estimates and 95% CI, were performed as appropriate. The NSHAP dataset allowed data to be weighted to provide an estimate of population characteristics representative of community-dwelling older Americans aged 57 to 85 years. Not all women answered all questions. Survey weights were used to account for the differential probability of inclusion in the sample and differential probability of nonresponse in all the analyses. Percentage estimates and 95% CI were obtained to report weighted frequencies. Logistic regression analysis was used to assess the association between sexual ideation (primary outcome) and oophorectomy status, current hormone therapy, demographic and clinical characteristics. Potential confounders were considered for inclusion in the final model based on their significance in univariable analysis ($p < .1$). Significant confounders were included in the final adjusted model if they continued to impact the final model ($p < .05$). Oophorectomy status and current systemic hormone therapy were included in the final model as these were our main independent variables of interest. Statistical analyses were performed using SAS 9.2 (SAS Institute, Inc., Cary, NC). Assuming a prevalence of sexual ideation of 50% (based on Lindau et al [16]), our analysis achieved 90% power to detect a difference of 10% in sexual ideation with a significance level (α) of 0.05 (two-sided).

Results

In total, 1,352 women were included in this analysis; 356 (26.3%) women who reported prior bilateral oophorectomy and 996 (73.7%) women who had retained their ovaries. No women were missing data on oophorectomy status.

Demographics and clinical characteristics were similar between the two groups although women with a prior bilateral oophorectomy were more likely to report current hormone therapy (59.1%, CI [53.0, 65.1]) and more likely to report previous hysterectomy (97.0%, CI [95.1–99.0]) compared with women who retained their ovaries (current hormone therapy 47.2%, CI [43.5, 50.8] and previous hysterectomy 23.3%, CI [20.1–26.4]). (Table 1) Mean age (68.7 ± 0.4 vs. 68.0 ± 0.3 , $p = .19$) and self-reported health (very good or excellent – 41.0% vs. 46.3%, $p = .32$) were similar between women with prior bilateral oophorectomy and women who had retained their ovaries. Among women with prior bilateral oophorectomy, 75.4% (95% CI 70.8%, 80.8%) had their ovaries removed prior to menopause.

Sexual ideation

Our primary outcome of interest was self-report of sexual ideation at least once monthly. No differences were observed between women with prior bilateral oophorectomy and women who had retained their ovaries (54.5%, CI [48.1, 60.9] vs. 49.9%, CI [46.0, 53.8], $p = .23$). (Table 2) Women who retained their ovaries did not demonstrate significantly increased odds of sexual ideation compared with women with prior bilateral oophorectomy (adjusted odds ratio (OR) = 1.32, [0.96, 1.81]) after adjusting for current systemic hormone therapy (estrogen and/or progesterone) age group, education, and race. (Table 3) Age group, education, and race were found to be significant in univariable analysis ($p < .1$) and to impact the final logistic regression model ($p < .05$). On univariable analysis, hysterectomy status, menopausal status at the time of oophorectomy, and years since oophorectomy did not

impact the model ($p > .1$) and were not included in the final logistic regress model. Percentage estimates of sexual ideation varied by age with decreasing sexual ideation reported by increasing age group (57–64 years (range, 65–74 years, and 75–85 years old). (Table 4) However, sexual ideation did not significantly vary between women with prior bilateral oophorectomy (either performed before or after menopause) and women who retained their ovaries within the three different age groups.

Current partner

No differences were observed in the number of women reporting a current partner between women with prior bilateral oophorectomy and women who had retained their ovaries (59.6%, CI [53.7, 65.4] vs. 63.6%, CI [60.3, 66.9], $p = .24$). The prevalence of a current partner again decreased with increasing age category.

Sexual frequency

No differences were observed in the percentage of women reporting sexual activity in the last 12 months between women with prior bilateral oophorectomy and women who had retained their ovaries (42.2%, CI [36.0, 48.4] vs. 44.5%, CI [40.8, 48.3], $p = .53$). Further comparisons of sexual frequency of once monthly, 2–3 times per month, and 1–2 times per week do not demonstrate a statistically significant difference ($p = .098$). (Table 2)

Type of sexual activity

Among all women with current sexual partners, women who reported prior bilateral oophorectomy were more likely to report vaginal intercourse (90.1%, CI [84.7, 95.5] vs. 82.3%, CI [77.9, 86.8], $p = .05$) compared with women who had retained their ovaries; however foreplay (90.1%, CI [84.7, 95.5] vs. 87.3%, CI [83.7, 91.0], $p = .46$), receiving oral sex (8.3%, CI [1.7, 14.9] vs. 9.7%, CI [6.0, 13.3], $p = .73$), giving oral sex (11.6%, CI [3.9, 19.4] vs. 11.2%, CI [6.8, 15.5], $p = .91$) were similar.

Sexual attitudes

One category regarding sexual attitudes, “Married person having sex with someone other than partner is always wrong even if partner is physically ill,” was noted to be significantly different between women with prior bilateral oophorectomy and women with intact ovaries (77.5 [72.2–82.9] vs. 67.9 [64.1–71.7], $p = .006$). Otherwise, no differences were observed between the two groups in sexual attitudes and beliefs, including religious beliefs guiding sexual behavior ($p = .16$) and sex being essential to maintain a relationship ($p = .99$).

Sexual problems

Report of sexual problems were similar between women with prior bilateral oophorectomy compared with women with retained ovaries, including lack of interest ($p = .86$), vaginal lubrication ($p = .88$), premature climax ($p = .95$), inability to climax ($p = .13$), pain with intercourse ($p = .59$), lack of pleasure ($p = .09$), performance anxiety ($p = .40$), and avoidance of sex due to problems ($p = .85$).

Premenopausal vs. postmenopausal oophorectomy

Among women with prior bilateral oophorectomy, 75.4% (95% CI 70.8%, 80.8%) had their ovaries removed prior to menopause. There was no significant difference in sexual ideation between women undergoing premenopausal oophorectomy and postmenopausal oophorectomy (57.5% [50.0%, 64.7%] vs. 49.1% [35.8%, 62.5%], $p = .12$). There were no significant difference in the report of sexual problems between women undergoing premenopausal vs. postmenopausal oophorectomy, including: lack of interest ($p = .97$),

vaginal lubrication ($p=.45$), inability to climax ($p=.84$), pain with intercourse ($p=.23$), lack of pleasure ($p=.21$), and avoidance of sex due to problems ($p=.26$).

Comment

We found sexual ideation and function was similar among community-dwelling older women with prior bilateral oophorectomy compared with women who had retained their ovaries. Lindau et al (16) previously reported on the sexual activity, frequency, attitudes, and problems of both women and men from this project. Their report shows that sexual function decreases with increasing age. However, hormonal status was not considered in their work.

One reported drawback of prophylactic oophorectomy women is decreased sexual function and hypoactive sexual desire disorder.(19–22) In one small prospective study conducted in Turkey, sexual function scores were found to significantly decrease in postmenopausal women six months after hysterectomy with bilateral oophorectomy when compared to preoperative scores.(20) The short length of this study and a lack of a control group of women with retained ovaries limits our knowledge of how oophorectomy affects sexual function in postmenopausal women long term. Finch et al (19) reported that premenopausal women with *BRCA* mutations undergoing prophylactic oophorectomy report a decrease in sexual functioning compared with postmenopausal women with *BRCA* mutations undergoing the same procedure, however this study was limited to follow-up of one year after surgery. Finally, Leiblum et al (21) reported hypoactive sexual desire disorder was more common among women under 50 years old who were surgically menopausal compared with their intact counterparts, however, no difference was seen in sexual desire in women over 50 years old who had undergone surgical menopause. While evidence suggests that premenopausal bilateral oophorectomy has a negative impact on sexual function, our findings as well as those of Leiblum et al (21) suggest the impact diminishes with increasing time from menopause. It is possible that the effects of bilateral oophorectomy on sexual function decrease as women age; therefore age, rather than oophorectomy, is the main contributor to sexual dysfunction in older women.

Limitations of our study include the self-report of oophorectomy. However, since women with one or more retained ovary may have mistakenly reported bilateral oophorectomy, and women mistakenly reporting to have intact ovaries may have undergone bilateral procedure, we believe misclassification would be non-differential. Our study is also limited by its cross-sectional design. Women were not asked about sexual function before and after oophorectomy; however, our findings suggest that oophorectomy status is not associated with a permanent and lasting effect on sexual function in older women. Our study is limited by being a secondary database analysis. Further information on certain variables was not collected. Specifically, we only have information on sexual ideation at least once monthly. No information on the monthly frequency of sexual ideation was available. Finally, this study discusses a very sensitive topic and is limited by participant non-response to certain questions. As reported by Lindau et al (16), overall 2 to 7% of respondents declined to answer questions about sexual activity and 14% declined to answer questions about masturbation. To account for non-response, weights were used to adjust for the bias of differential non-response. Our study is also strengthened by the large sample size representative of the community dwelling older women in the United States and detailed information on numerous aspects of sexual function in this older population, enhancing the study's external validity. In brief, our findings suggest that elective oophorectomy may not play a long-term pivotal role in the sexual ideation and function of older women.

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Table 1Characteristics of 1,352 Community-Dwelling Females age 57 to 85 years^a

Variable	Respondents	Retained Ovaries (N= 996)	Bilateral Oophorectomy (N= 356)	p-value
Overall	1,352	74.2 (71.5–76.9)	25.8 (23.1–28.5)	
Age (Year, Mean ± SE)		68.04 ± 0.28	68.73 ± 0.44	.186
Age Category, years				.092
57–64	548	42.6 (39.0–46.3)	34.5 (28.5–40.5)	
65–74	470	32.9 (29.5–36.3)	40.0 (34.0–46.0)	
75–85	334	24.5 (21.6–27.3)	25.5 (20.6–30.4)	
Race				.903
White	1,129	84.1 (81.9–82.3)	82.4 (78.3–86.5)	
Black	154	10.7 (8.9–12.5)	13.4 (9.8–17.1)	
American Indian	5	0.3 (0.0–0.8)	0.5 (0.0–1.2)	
Asian	13	1.3 (0.5–2.0)	0.2 (0.0–0.7)	
Other	48	3.6 (2.6–4.7)	3.5 (1.7–5.2)	
Ethnicity				.071
Hispanic	100	8.1 (6.4–9.7)	5.4 (3.3–7.5)	
Education				.553
Less than High School	283	20.6 (17.8–23.3)	21.9 (16.8–27.1)	
High School or equiv.	397	29.4 (26.0–32.7)	29.4 (24.0–34.8)	
Some College	422	31.1 (27.6–34.6)	31.4 (25.8–37.0)	
Bachelor's Degree or Higher	250	18.9 (16.1–21.8)	17.3 (12.4–22.1)	
Self-Reported Health				.320
Poor	81	6.1 (4.6–7.6)	5.7 (2.8–8.7)	
Fair	238	17.3 (14.7–19.9)	18.8 (14.5–23.1)	
Good	422	30.4 (27.0–33.9)	33.9 (28.3–39.4)	
Very Good	425	32.1 (28.7–35.5)	30.0 (24.2–35.8)	
Excellent	182	14.1 (11.5–16.8)	11.6 (7.2–16.1)	
Current Hormone Therapy	1,336	47.2 (43.5–50.8)	59.1 (53.0–65.1)	.001
Hysterectomy	1,349	23.3 (20.1 – 26.4)	97.0 (95.1, 99.0)	<.001
Premenopausal oophorectomy	334	--	75.4 (70.0–80.8)	--

All values listed as percent (95% confidence interval) unless otherwise specified.

^aEstimates are weighted to account for differential probabilities of selection and differential nonresponse.

Table 2Types of Sexual Activities, Frequency, Attitudes, and Problems ^a

Variable	Respondents	Retained Ovaries (N= 996)	Bilateral Oophorectomy (N= 356)	p-value
Sexual Ideations	1,184	49.9 (46.0–53.8)	54.5 (48.1–60.9)	.227
Current Sexual Partner	1,352	63.6 (60.3–66.9)	59.6 (53.7–65.4)	.238
Currently Married	652	91.7 (89.2–94.2)	90.1 (85.4–94.7)	
Cohabiting	27	3.6 (1.9–5.4)	3.2 (0.3–6.2)	
Other Intimate Partner	46	4.6 (2.8–6.5)	6.7 (3.0–10.4)	
Sexual Activities				
Foreplay	463			.456
Never, Rarely, or Sometimes		12.7 (9.0–16.3)	9.8 (3.9–15.8)	
Usually or Always		87.3 (83.7–91.0)	90.2 (84.2–96.1)	
Vaginal Intercourse	450			.051
Never, Rarely, or Sometimes		17.7 (13.2–22.1)	9.9 (4.5–15.3)	
Usually or Always		82.3 (77.9–86.8)	90.1 (84.7–95.5)	
Receive Oral Sex	439			.728
Never, Rarely, or Sometimes		90.3 (86.7–94.0)	91.7 (85.2–98.3)	
Usually or Always		9.7 (6.0–13.3)	8.3 (1.7–14.9)	
Give Oral Sex	438			.914
Never, Rarely, or Sometimes		88.8 (84.5–93.2)	88.4 (80.6–96.1)	
Usually or Always		11.2 (6.8–15.5)	11.6 (3.9–19.4)	
Masturbation in Previous 12 Mo	1,133	25.3 (21.9–28.8)	21.7 (16.3–27.2)	.286
Sexual Frequency				
Sex in Previous 12 Month	1,301	44.5 (40.8–48.3)	42.2 (36.0–48.4)	.529
Sex Frequency	443			.098
Once per Month		40.7 (34.4–47.1)	30.6 (30.0–40.2)	
2–3 Times per Month		28.1 (22.7–33.5)	31.0 (21.3–40.7)	
1–2 Times per Week		31.2 (25.4–37.0)	38.4 (28.2–48.6)	
Sexual Attitudes, Values & Beliefs				
Married Person Having Sex with Someone Other than Partner:				
Is Always Wrong	941	82.2 (79.1–85.3)	89.5 (85.5–93.6)	.011
Is Always Wrong Even if Partner Has Dementia	762	68.8 (65.1–72.6)	75.6 (69.7–81.5)	.068
Is Always Wrong Even if Partner is Physically Ill	752	67.9 (64.1–71.7)	77.5 (72.2–82.9)	.006
Religious Beliefs Have Guided Sexual Behavior	1,090			.160
Strongly Disagree		6.2 (4.4–8.0)	5.0 (2.5–7.6)	
Disagree		17.7 (14.6–20.9)	17.0 (12.1–21.8)	
Agree		31.5 (27.7–35.3)	26.5 (21.0–31.9)	
Strongly Agree		44.5 (40.5–48.7)	51.5 (45.0–58.1)	
Sex is Essential to Maintaining a Relationship	1,083			.990

Variable	Respondents	Retained Ovaries (N= 996)	Bilateral Oophorectomy (N= 356)	p-value
Strongly Disagree		4.1 (2.7–5.6)	3.6 (1.1–6.1)	
Disagree		25.5 (21.9–29.1)	26.9 (20.9–32.8)	
Agree		45.0 (40.9–49.0)	43.8 (37.1–50.5)	
Strongly Agree		25.4 (21.9–28.9)	25.8 (19.9–31.6)	
Sexual Ability Decreases with Age	1,089			.694
Strongly Disagree		4.4 (2.9–5.9)	4.5 (2.1–6.9)	
Disagree		24.0 (20.1–27.4)	21.9 (16.1–27.6)	
Agree		51.4 (47.4–55.5)	57.7 (51.0–64.3)	
Strongly Agree		20.2 (17.0–23.4)	16.0 (11.3–20.8)	
Sex is an Important Part of Life	1,244			.461
Not at all Important		34.2 (30.8–37.7)	37.0 (31.0–43.0)	
Somewhat Important		21.1 (17.8–24.4)	20.0 (15.1–24.9)	
Moderately Important		27.0 (23.6–30.5)	27.0 (21.2–32.9)	
Very Important		13.3 (10.7–15.9)	12.1 (8.3–16.0)	
Extremely Important		4.4 (2.6–6.1)	3.8 (1.2–6.5)	
Sexual Problems				
Lack of Interest	452	44.2 (38.0–50.4)	45.3 (34.8–55.7)	.865
Vaginal Lubrication	446	38.5 (32.4–44.5)	37.6 (27.6–47.6)	.885
Premature Climax	434	8.7 (5.3–12.2)	9.0 (3.0–14.9)	.948
Inability to Climax	432	36.8 (30.6–42.9)	28.2 (19.3–37.1)	.127
Pain with Intercourse	457	17.6 (12.9–22.3)	15.1 (7.5–22.7)	.588
Lack of Pleasure	450	26.5 (21.0–32.0)	17.9 (10.3–25.5)	.090
Performance Anxiety	452	12.6 (8.6–16.6)	9.5 (4.1–15.0)	.398
Avoidance of Sex Due to Problems	319	33.1 (26.1–40.1)	31.7 (19.5–44.0)	.854

All values listed as percent (95% confidence interval) unless otherwise specified.

^aEstimates are weighted to account for differential probabilities of selection and differential nonresponse. The analyses for sexual activity (not including masturbation), frequency, and problems are limited to the 725 (53.6%) of women who reported having a current sexual partner.

Table 3

Logistic Regression Model for Association of Sexual Ideation and Bilateral Oophorectomy

Variable	Adjusted OR	95% CI	p-value
Bilateral Oophorectomy	1.32	(0.96, 1.81)	.086
Current Hormone Therapy	1.09	(0.82, 1.47)	.552
Age Group, years			<.0001 *
57–64 (referent)	1		
65–74	0.30	(0.21, 0.44)	<.0001
75–85	0.54	(0.38, 0.75)	.0003
Race			.0264 *
White (referent)	1		
American Indian or Alaskan Native	0.11	(0.01, 1.00)	.050
Asian or Pacific Islander	0.22	(0.06, 0.80)	.022
Black	0.87	(0.58, 1.32)	.516
Other	0.612	(0.32, 1.17)	.135
Education			<.0001 *
Less than High School (referent)	1		
High School or Equivalent	1.71	(1.11, 2.63)	.014
Some College	2.82	(1.85, 4.30)	<.0001
Bachelor's Degree or more	4.85	(2.95, 7.99)	<.0001

* Overall significance of variable

OR= Odds Ratio

CI= Confidence Interval

Sexual Function after Bilateral Oophorectomy – Premenopausal Oophorectomy vs. Postmenopausal Oophorectomy by Age Group. N=1,334^a

Table 4

Variable	Respondents									
	57-64 Years Old (N=447)			65-74 Years Old (N=472)			75-85 Years Old (N=415)			
	Retained Ovaries (N=350)	Premeno-pausal Oophorectomy (N=75)	Postmeno-pausal Oophorectomy (N=22)	Retained Ovaries (N=332)	Premeno-pausal Oophorectomy (N=113)	Postmeno-pausal Oophorectomy (N=27)	Retained Ovaries (N=314)	Premeno-pausal Oophorectomy (N=65)	Postmeno-pausal Oophorectomy (N=36)	
Sexual Intentions	1,184	63.2 (57.2-69.3)	65.4 (52.3-78.5)	83.4 (66.6-100)	61.5 (50.4-72.6)	39 (15.7-62.2)	32.6 (25.8-39.5)	34.8 (20-49.6)	29.8 (11.4-48.1)	
Current Sexual Partner	1,334	74.8 (69.9-79.7)	74.2 (62.7-85.8)	93.3 (84.9-100)	64.3 (58.5-70.1)	58.5 (36-81)	43.1 (36.6-49.6)	46 (32-60.1)	21.8 (5.8-37.7)	
Currently Married	678	89.3 (85.2-93.4)	93.5 (85.2-100)	94.6 (83-100)	88.4 (80.8-96.1)	67.7 (34.9-100)	93.5 (88.8-100)	93.1 (82.8-100)	91.4 (69.8-100)	
Cohabiting	27	4.5 (1.8-7.2)	3.7 (0-10.9)	5.4 (0-17)	3.3 (0-6.7)	5.2 (0-17)	1.6 (0-3.3)	4 (0-12.4)	0	
Other Intimate Partner	49	6.2 (3-9.4)	2.9 (0-7.2)	0	2.1 (0.5-3.8)	27.1 (0-59.4)	4.9 (0.5-9.3)	2.9 (0-9)	8.6 (0-30.2)	
Sexual Activities										
Foreplay	462									
Never, Rarely, or Sometimes		12.4 (7.6-17.1)	12.2 (1.2-23.2)	4.8 (0-15.7)	12.5 (6-19)	13.4 (0-26.7)	15.2 (1-29.4)	5.3 (0-17.9)	0	
Usually or Always		87.6 (82.9-92.4)	87.8 (76.8-98.8)	95.2 (84.3-100)	87.5 (81-94)	86.6 (73.3-100)	84.8 (70.6-99)	94.7 (82.1-100)	100	
Vaginal Intercourse	450									
Never, Rarely, or Sometimes		15.6 (9.9-21.2)	4.7 (0-11.6)	7 (0-22.4)	18.5 (10.4-26.6)	10 (1-19)	29.7 (12.9-46.5)	38.5 (0-77.4)	0	
Usually or Always		84.4 (78.8-90.1)	95.3 (88.4-100)	93 (77.6-100)	81.5 (73.4-89.6)	90 (81-99)	70.3 (53.5-87.1)	61.5 (22.6-100)	100	
Receive Oral Sex	438									
Never, Rarely, or Sometimes		90.2 (85.4-95)	89.2 (74.7-100)	100	89.8 (83.5-96.2)	94.8 (88.7-100)	93 (82.1-100)	100	100	
Usually or Always		9.8 (5-14.6)	10.8 (0-25.3)	0	10.2 (3.8-16.5)	5.2 (0-11.3)	7 (0-17.9)	0	0	
Give Oral Sex	437									
Never, Rarely, or Sometimes		85.6 (79.2-91.9)	89.1 (74.3-100)	100	95.4 (91-99.9)	87.1 (73-100)	91.6 (80.3-100)	90.5 (68.6-100)	100	
Usually or Always		14.4 (8.1-20.8)	10.9 (0-25.7)	0	4.6 (0.1-9)	12.9 (0-27)	8.4 (0-19.7)	9.5 (0-31.4)	0	
Masturbation in Previous 12 Months	1,126	34.1 (28-40.1)	29.7 (16.8-42.5)	20.2 (0-41.7)	20.8 (15.2-26.3)	22.1 (12.2-31.9)	15.3 (10.6-20.1)	24.3 (10.5-38.2)	0	
Sexual Frequency										
Sex in Previous 12 Months	1,284	64.5 (58.8-70.2)	55.2 (42-68.4)	80.5 (62.4-98.6)	39.1 (32.7-45.5)	44.8 (33.6-56)	16.2 (10.9-21.4)	23.9 (10.3-37.5)	11.7 (0-24.2)	
Sex Frequency	442									
Once per Month		40.5 (32.1-49)	31.1 (13.9-48.7)	25.8 (0-64)	41 (29.6-52.3)	25.6 (11.9-39.2)	41.2 (22.6-59.7)	61.5 (21.7-100)	20.9 (0-100)	
2-3 Times per Month		25.7 (19-32.4)	18 (5.1-31)	46.5 (11.9-81)	31.8 (21.4-42.2)	27.2 (0-62.9)	33.5 (14.7-52.3)	28.2 (0-64.3)	24.9 (0-100)	
1-2 Times per Week		33.7 (26-41.5)	50.6 (31.5-69.8)	27.7 (0.4-55)	27.2 (17.7-36.8)	34.3 (16.8-51.8)	25.4 (6-44.7)	10.2 (0-34.2)	54.1 (0-100)	
Sexual Attitudes, Values & Beliefs										
Married Person Having Sex with Someone Other than Partner:										
Is Always Wrong	927	79.4 (74.2-84.6)	84.4 (74.9-93.9)	93.6 (83.5-100)	81.3 (75.6-87)	88.3 (79.7-96.9)	88.4 (83.9-93)	92 (83-100)	94.7 (86-100)	
Is Always Wrong Even if Partner Has Dementia	750	66.6 (60.3-72.8)	74.5 (62.6-86.5)	88 (72.8-100)	66.5 (59.9-73.2)	69 (56.3-81.7)	76.3 (70-82.6)	82.5 (71.2-93.8)	70.1 (50.7-89.4)	
Is Always Wrong Even if Partner is Physically Ill	742	68.4 (62.4-74.5)	75 (63.1-86.8)	88 (72.8-100)	63.7 (56.9-70.6)	76.6 (65.9-87.3)	73 (66.3-79.7)	84.2 (73.3-95)	65.5 (45.6-85.5)	

Variable	Respondents	57–64 Years Old (N=447)			65–74 Years Old (N=472)			75–85 Years Old (N=415)		
		Retained Ovaries (N=350)	Premeno-pausal Oophorectomy (N=75)	Postmeno-pausal Oophorectomy (N=22)	Retained Ovaries (N=332)	Premeno-pausal Oophorectomy (N=113)	Postmeno-pausal Oophorectomy (N=27)	Retained Ovaries (N=314)	Premeno-pausal Oophorectomy (N=65)	Postmeno-pausal Oophorectomy (N=36)
Religious Beliefs Have Guided Sexual Behavior	1,076									
Strongly Disagree		7.5 (4.3–10.8)	5.1 (0–11.3)	11.4 (0–25.8)	5 (2.5–7.6)	4.6 (0.6–8.5)	1.5 (0–4.7)	5.5 (2–9)	3.5 (0–8.5)	3.2 (0–9.7)
Disagree		19.5 (14.2–24.7)	19.4 (8.3–30.5)	16.7 (0–36)	20.2 (14.1–26.3)	14.4 (5.8–22.9)	20.3 (0–41.5)	11.3 (7.1–15.5)	20.9 (9–32.9)	13.1 (0–28)
Agree		35.6 (29.2–42)	29.6 (16.7–42.6)	17.5 (0.2–34.8)	25.5 (19.4–31.6)	31.4 (21–41.8)	13.7 (0–29.7)	32.4 (25.4–39.5)	22.3 (10.2–34.5)	32.2 (12.2–52.2)
Strongly Agree		37.4 (30.9–43.9)	45.9 (31–60.8)	54.4 (27.2–81.6)	49.3 (42.3–56.2)	49.7 (37.5–61.8)	64.5 (40.6–88.4)	50.7 (43.4–58.1)	53.2 (38.3–68.2)	51.5 (30.6–72.5)
Sex is Essential to Maintaining a Relationship	1,070									
Strongly Disagree		2.9 (0.9–4.8)	4.4 (0–9.9)	0	5.5 (2.6–8.4)	2.8 (0–6.1)	15.2 (0–35.9)	4.5 (1.8–7.3)	1.4 (0–4.3)	0
Disagree		24.4 (18.6–30.2)	32.3 (18.7–46)	19.4 (0–39.3)	29.6 (23–36.1)	27.4 (16.7–38)	23.2 (1.3–4.5)	21.7 (15.7–27.7)	23.4 (1.2–35.5)	30.5 (4.7–56.3)
Agree		47.2 (40.5–53.8)	37 (23.3–50.7)	52.5 (24.7–80.2)	40.1 (33.3–46.9)	46 (33.4–58.5)	30.2 (9.1–51.2)	47.9 (40.4–55.4)	55.3 (40.3–70.4)	35.7 (14.6–56.7)
Strongly Agree		25.6 (19.9–31.3)	26.4 (12.4–40.3)	28.2 (4.2–52.1)	24.8 (18.9–30.7)	23.8 (14.2–33.4)	31.5 (8.4–54.6)	25.8 (19.6–32.1)	19.9 (7.2–32.6)	33.8 (13.2–54.5)
Sexual Ability Decreases with Age	1,077									
Strongly Disagree		5.6 (2.9–8.4)	3.4 (0–7.9)	3.7 (0–11.7)	3.8 (1.4–6.1)	6.6 (1.4–11.8)	5 (0–12.9)	3 (0.6–5.4)	5.3 (0–12.7)	0
Disagree		28.2 (22.4–34.1)	22.9 (8.9–36.9)	15.9 (0–33.5)	22.3 (16.6–28)	25.1 (14.1–36.2)	21.1 (1.6–40.6)	18.7 (13.2–24.2)	20.1 (8.2–32.1)	16.7 (0.3–33.2)
Agree		51.8 (45.1–58.4)	65.9 (51.4–80.4)	65 (39.4–90.5)	54.1 (47.2–61)	50.5 (38.4–62.6)	37.9 (13–62.9)	47.2 (39.9–54.5)	57.4 (41.9–72.9)	73.1 (54–92.2)
Strongly Agree		14.4 (9.6–19.2)	7.8 (1.2–14.4)	15.5 (0–35.7)	19.8 (14.3–25.3)	17.8 (9.1–26.5)	36 (10.2–61.8)	31.1 (24.3–37.9)	17.2 (4.3–30.1)	10.2 (0–21.2)
Sex is an Important Part of Life	1,255									
Not at all Important		23.3 (18.2–28.5)	28.1 (15.4–40.8)	9.8 (0–22.7)	35.2 (29.2–41.1)	29.1 (19–39.1)	46.5 (22.7–70.3)	52 (45.2–58.8)	46 (31.9–60)	80.2 (65–95.4)
Somewhat Important		25 (19.5–30.5)	29.5 (17.1–41.8)	8.8 (0–19.9)	19.7 (14–25.4)	21.6 (12.9–30.2)	9.4 (0–21.7)	16.2 (11.1–21.4)	19.9 (7.2–32.5)	7.2 (0–16.5)
Moderately Important		26.7 (21.1–32.2)	25.5 (14.4–36.6)	59.3 (33.4–85.3)	32.1 (25.9–38.3)	32.8 (21.3–44.4)	29.4 (7.7–51.1)	20.7 (14.9–26.6)	17.3 (5–29.6)	4.3 (0–10.7)
Very Important		17.7 (12.9–22.5)	12.7 (4–21.4)	7.7 (0–20.1)	10.1 (6.3–13.9)	14 (6.6–21.5)	10.7 (0–22.7)	9.8 (6.9–13.8)	12.8 (3.6–21.9)	8.3 (0–19.4)
Extremely Important		7.3 (3.6–10.9)	4.2 (0–11.2)	14.4 (0–34.8)	3 (1–4.9)	2.5 (0–5.5)	4 (0–12.3)	1.2 (0.1–2.3)	4.1 (0–9.2)	0
Sexual Problems										
Lack of Interest	450	45 (36.7–53.3)	51.4 (32.3–70.6)	52.6 (17.9–87.3)	41 (30.1–51.9)	32.9 (15.4–50.4)	38.8 (0–80)	48.7 (29.7–67.8)	69 (34.8–100)	0
Vaginal Lubrication	444	36.9 (29–44.8)	30.5 (13.8–47.2)	32.9 (0–72.8)	40.6 (29.7–51.5)	37.6 (20.4–54.8)	75.7 (38.6–100)	43.2 (22.6–63.7)	44 (4.4–83.6)	54.1 (0–100)
Premature Climax	433	7.9 (3.5–12.3)	14.4 (1.3–27.6)	20.7 (0–51)	10.9 (4.1–17.8)	1.1 (0–3.5)	0	7.7 (0–16.7)	6.1 (0–21.2)	20.9 (0–100)
Inability to Climax	430	35.8 (27.6–43.9)	30.7 (13.1–48.4)	25.6 (0–53.8)	38.1 (27.1–49.1)	27.3 (12.7–41.9)	18.7 (0–49.3)	40 (21.2–58.9)	17.1 (0–45.5)	75.1 (0–100)
Pain with Intercourse	455	19.1 (12.8–25.5)	7.2 (0–14.8)	28 (0–66.3)	17.7 (8.8–26.6)	15.7 (3.1–28.3)	30.2 (0–68.3)	6.5 (0–14.5)	19 (0–50.2)	0
Lack of Pleasure	448	26.9 (19.6–34.2)	21.6 (5.2–37.9)	7.2 (0–23.1)	26.5 (16.7–36.3)	16.4 (5.1–27.8)	19.8 (0–52)	23.4 (6.9–39.9)	34.2 (0–74.1)	0
Performance Anxiety	450	11.6 (6.7–16.6)	11.2 (0.8–21.6)	7 (0–22.4)	15.5 (7–24)	9.4 (0–19)	19.8 (0–52)	10 (0–20.5)	0	0
Avoidance of Sex Due to Problems	318	31.9 (22.9–40.9)	45.4 (21.8–69.1)	49.1 (0.2–98)	36 (23.1–48.9)	18.8 (0.3–37.2)	34.8 (0–79.1)	31.8 (7.8–55.7)	0	0

All values listed as percent (95% confidence interval) unless otherwise specified.

^aDoes not include 18 respondents for which menopausal status at the time of oophorectomy is unknown. Estimates are weighted to account for differential probabilities of selection and differential nonresponse. The analyses for sexual activity (not including masturbation), frequency, and problems are limited to the 720 (53.9%) of women who reported having a current sexual partner.