Published in final edited form as:

J Psychosom Obstet Gynaecol. 2014 June ; 35(2): 62–68. doi:10.3109/0167482X.2014.899577.

Relationship satisfaction predicts sexual activity following risk-reducing salpingo-oophorectomy

Tierney Lorenz¹, Bonnie McGregor², and Elizabeth Swisher²

¹Kinsey Institute, Indiana University, Bloomington, IN, USA

²Fred Hutchinson Cancer Research Center, Seattle, WA, USA

Abstract

Changes in sexual function are a common outcome following risk-reducing salpingo-oophorectomy (RRSO), a prophylactic surgery for women at high risk of ovarian and other gynecologic cancers. Despite the known importance of sexuality in patients' quality of life and satisfaction with surgery, little is known about what predicts sexual activity following RRSO. The present study examined how mental and physical health variables predicted sexual activity before and after RRSO. We conducted a secondary analysis of quality of life measures collected in 85 women at high risk for ovarian cancer. Participants completed validated measures of mental, physical, and relationship health 1–2 weeks before surgery, and 2, 6 and 12 months following surgery. Across analyses, relationship satisfaction emerged as the most significant predictor of change in sexual activity: women with high relationship satisfaction were more likely to continue to have regular sexual activity following RRSO, even in the presence of vaginal menopausal symptoms. The effect of depression, anxiety and overall physical health on sexual activity was non-significant when controlling for relationship satisfaction. When counseling women about RRSO and its impact on sexual activity, clinicians should discuss the effect of the patient's relationship health on this outcome.

Keywords

Cancer; prophylactic oophorectomy; quality of life; sexual activity; sexual function; women

Introduction

Ovarian cancer is the fifth leading cause of cancer death among women in the US [1]. Due to increased risk, women with a known mutation of the *BRCA1* or *BRCA2* genes may elect to undergo risk-reducing salpingo-oophorectomy (RRSO), the prophylactic surgical removal of ovaries and fallopian tubes. While effective in reducing risk of mortality from gynecologic cancers [2], RRSO is not without side effects.

© 2014 Informa UK Ltd.

Address for correspondence: Tierney Lorenz, Ph.D, Kinsey Institute, Indiana University, Morrison Hall 326, Bloomington, IN 47402, USA. Tel: +81 28569036. lorenzt@indiana.edu.

Declaration of interest

The authors have no conflict of interest to disclose.

Among the most commonly reported side effects of RRSO are menopausal symptoms (particularly vaginal dryness and pain with intercourse) and subsequent changes in sexual function [3,4]. Sexual dysfunction following RRSO is the strongest predictor of dissatisfaction with surgery [3,5], especially among younger patients. Although several studies have documented high rates of sexual problems following RRSO (from 30–65%, [3,5-8] particularly in the short-term [8]), little is known about what distinguishes women who do and do not develop lasting sexual problems. For example, Fang et al. [8] reported that the majority of women reporting decreased sexual activity one month following RRSO returned to their usual sexual habits within a year; however, they did not test predictors of changes in sexual activity.

There are a number of physical and mental health factors influenced by RRSO that are relevant to sexual function. Lower estrogen production can cause a decrease in vaginal lubrication associated with sexual arousal [6] and possibly lower sexual desire as well [7]. Post-surgical climacteric symptoms such as hot flashes and fatigue can also negatively impact sexual desire and satisfaction [9].

Mental health can also be impacted by RRSO, both positively and negatively [7]. Several reports suggest that RRSO is associated with improvements in anxiety, particularly cancer-related health anxiety [3,5] (McGregor, Charbonneau, Ceballos, Barhart, Fann, Paley, Swisher, Unpublished Data, March 2014). Similarly, RRSO is generally associated with a decrease in depressive symptoms [10]. Both depression and anxiety are strongly associated with poorer sexual function in women [11,12], suggesting that RRSO might have a positive effect on sexual wellbeing by way of improved mental health. However, another common menopausal symptom following RRSO is weight gain, which can negatively impact body esteem [6], and in turn, sexual satisfaction [13].

Because RRSO can have such a dramatic impact on physical and mental health variables related to sexual function, it is often overlooked that for most women, sexual activity takes place in the context of a relationship. Satisfaction with one's relationship is likely a very important predictor of the sexual wellbeing of women undergoing RRSO. Studies suggest that even in the presence of poor physical function, women are less likely to report sexual dysfunction when they are satisfied with their relationship. In the WISHeS sample of over 2000 women undergoing menopause, approximately 25–75% of women who reported low sexual desire were not distressed by their sexual problems [14]. Younger women and surgically post-menopausal women were more likely to report distress regarding sexual problems. However, women with high relationship satisfaction were less likely to report distress regarding sexual problems [14]. In another study, women with a history of oophorectomy were more likely than controls to report problems with sexual arousal, yet objective measures of vaginal blood flow to erotic images did not differ between groups. Relationship satisfaction, however, was a significant predictor of subjectively-reported arousal problems [15]. Interestingly, changes in frequency of sexual activity may drive changes in relationship satisfaction for men, but not for women [16]. These studies highlight both the uniqueness of the constructs of relationship satisfaction and sexual function and illustrate their association. As relationship satisfaction is associated with better sexual

wellbeing in healthy women, it is likely to be a protective factor for women undergoing RRSO.

In the present study, we used data collected for a larger study of quality of life following RRSO to examine the question of relationship satisfaction and its role in sexuality, defined here as the presence or absence of sexual activity in the last month. We hypothesized the following:

1. Better mental health (lower depression and anxiety), physical health (higher self-reported overall health and lower vaginal menopausal symptoms), and higher relationship satisfaction would predict sexual activity, both before and after RRSO.
2. Vaginal symptoms would be associated with changes in sexual activity following RRSO.
3. Relationship satisfaction would act as a protective factor, such that women with high relationship satisfaction would continue to engage in sexual activity even when also reporting vaginal symptoms.

Methods

The present study was a secondary analysis of data previously collected (McGregor, Charbonneau, Ceballos, Barhart, Fann, Paley, Swisher, Unpublished Data, March 2014). Briefly, 119 women at high risk for ovarian cancer due to family history were recruited from three gynecological clinics in the Seattle area. Potential participants were given information about the study by their gynecologist in an appointment 1–2 weeks prior to surgery. Participants were given a questionnaire (which included an informed consent packet) and instructed to mail the completed packet to the study coordinator; follow-up questionnaires were mailed to the participant at 2, 6 and 12 months following surgery. Participants were assured that their medical providers would not be informed of their participation and that their data would be kept confidential and not associated with their personal information. The study was approved by the Fred Hutchinson Cancer Research Center Institutional Review Board. The present analyses include the 85 women who completed the sexual activity measure (see below) and were in a relationship at all time points (Table 1 for demographics). Completers did not differ from non-completers in age or years of education ($F(1,116) = 0.14, p = 0.71$ and $F(1,116) = 0.01, p = 0.91$, respectively), or in ethnicity, number of children, or menstrual status at time of surgery ($\chi^2(6) = 4.37, p = 0.63$; $\chi^2(1) = 1.17, p = 0.28$; and $\chi^2(3) = 2.06, p = 0.56$, respectively). Most women in the final sample ($n = 70$) had RRSO with hysterectomy, and the minority ($n = 33$) took hormone replacement therapy (HRT) during at least one time point, which was representative of the population of gynecologic cancer patients undergoing RRSO in the Seattle area [17].

Measures

Center for Epidemiological Studies – Depression—*The Center for Epidemiological Studies – Depression* (CES-D) [18] is a widely used, extensively validated 20-item measure of depression symptoms, including thoughts, feelings, behaviors and somatic symptoms [19].

State-Trait Anxiety Inventory—The *State-Trait Anxiety Inventory* (STAI) [20] is a 40-item inventory of state anxiety (“right now”, 20 items) and trait anxiety (“generally”, 20 items). We used the Trait subscale to capture participants’ clinically relevant anxiety [21]. We chose the Trait subscale as our index of clinically relevant anxiety as the State subscale reflects more transient changes in mood. However, as a manipulation check we ran all analyses with the State subscale in place of the Trait subscale and found no significant differences with the findings presented here.

Physical health perception item—We measured participants’ self-reported physical health with a single-item probe: “In general, how would you rate your health now?” This item has shown good convergent validity with more detailed measures of health such as the 36-item Medical Outcomes Survey [22]. In the present study, participants chose from five response options ranging from “poor” to “excellent”.

Menopausal Symptoms Scale—The original *Menopausal Symptoms Scale* (MSS) [23] was developed as a checklist of 52 menopausal symptoms most often reported by a sample of 875 post-menopausal women [23,24]. We used a revised version of the 16 items validated as most relevant to women following cancer treatment [25] with five factors supported by factor analysis: vasomotor symptoms, urinary incontinence, cognitive/mood changes, vaginal symptoms, and weight gain/appearance concern. Each symptom was rated on frequency within the last month on a five-point Likert response scale ranging from 0 (not at all) to 4 (extremely). Additionally, our revised version did not include the “pain with intercourse” item due to overlap with our sexual activity construct (see below); the vaginal symptoms subscale and total scores were adjusted accordingly.

Sexual activity—One item in the MSS inquires about pain with sexual intercourse. If participants had not engaged in sexual intercourse in the past month, they indicated “n/a – no intercourse in the past month”. Using this data, we constructed a dichotomous variable indicating the presence or absence of sexual intercourse in the past month for each time point. Although lacking in fine detail, measures of sexual activity in the past month have shown good sensitivity for sexual dysfunction in a cancer population [27]. Women who skipped this question (or otherwise had missing data for this item) were not included in the present analyses.

Relationship satisfaction—We measured each participant’s happiness in their intimate relationship with a single item probe: “Choose the number from 1 to 7 that best describes your current degree of happiness in your relationship”. Item responses ranged from “very dissatisfied” to “very satisfied”. Additionally, participants could choose “I am not currently in a relationship”; from this data, we excluded women who indicated either no sexual partner at baseline ($n = 21$) or a change in relationship status ($n = 8$) across the trial.

Results

Predictors of sexual activity before and following RRSO

We hypothesized that mental health (lower depression and anxiety), physical health (higher self-reported overall health and lower vaginal symptoms) and higher relationship

satisfaction would increase the likelihood that participants reported sexual activity at each time point. To test these hypotheses, we conducted separate binomial logistic regressions for each time point, with the dichotomous intercourse scale as the dependent variable. In the first block, we controlled for age, surgery type, and use of HRT. (For the first time point – i.e. the pre-surgery assessment – we also included current menopausal status). In the second block, we entered depression (CES-D), anxiety (STAI-Trait), physical health, relationship satisfaction, and vaginal menopausal symptoms (MSS-vaginal) using forward stepwise conditional entry. The stepwise procedure identified only the strongest predictors, reducing the risk of Type I error.

For three of the four time points (pre-surgery, 6 and 12 months following surgery), relationship satisfaction was the strongest predictor of the likelihood participants reported intercourse in the past month (Table 2). In each case, higher relationship satisfaction was associated with greater likelihood of the participant reporting intercourse in the past month. No other variable emerged as a significant predictor of sexual activity at any time point.

Predictors of change in sexual activity following RRSO

We hypothesized that vaginal symptoms would predict change in sexual activity following RRSO. We also predicted that relationship satisfaction would preserve sexual activity in the presence of vaginal symptoms. To examine changes in sexual activity across follow-ups, we classified women into one of five groups: ALL (reported sex throughout the trial; $n = 54$); NEVER (reported no sex throughout the trial; $n = 14$); TEMP (temporary stop in sexual activity, e.g. reported sex at baseline, no sex at the first follow-up, but sex at each subsequent follow-up; $n = 5$); STOP (stopped having sex, e.g. reported sex at baseline but at no subsequent follow-up; $n = 6$); and START (started having sex, e.g. reported no sex at baseline but sex at subsequent follow-ups; $n = 6$). As there was no significant change in relationship satisfaction across the trial (repeated measures $F(3,54) = 2.14, p = 0.10$), we calculated the average relationship satisfaction across time points for each participant.

We conducted a multinomial logistic regression with change status as the dependent variable. We controlled for age, surgery type and HRT use in the first block. In the second block, we entered average relationship satisfaction and vaginal symptoms at each time point. In the final block, we entered the interaction between relationship status and vaginal symptoms using stepwise entry (thus forcing only significant interactions to be entered in the model).

The model was significant ($\chi^2(40) = 97.83, p < 0.001$). There was a significant interaction between relationship satisfaction and vaginal symptoms at 2 months post-surgery follow-up ($\chi^2(4) = 18.63, p < 0.001$) and the 12 months post-surgery follow-up ($\chi^2(4) = 11.60, p < 0.05$). Plots of these interactions revealed similar patterns: for women with low relationship satisfaction, higher levels of vaginal symptoms were associated with a greater likelihood they would be in the STOP or NEVER groups and a lower likelihood of being in the ALL, TEMP, or START groups (Figure 1). In contrast, for women with high relationship satisfaction, there was no relationship between vaginal symptoms and group status; they were more likely to be in the ALL or TEMP groups regardless of level of reported vaginal symptoms. In other words, when women reported low relationship satisfaction, they were at

higher risk of stopping sex following RRSO when experiencing vaginal symptoms. On the other hand, when women reported high relationship satisfaction, they were more likely to continue to have sex following RRSO (either continuously or only taking a temporary break), even when they experienced high vaginal symptoms.

Discussion

This study examined predictors of sexual activity in women undergoing RRSO. Across analyses, we found that relationship satisfaction was associated with higher likelihood of engaging in sexual activity both before and after RRSO. Moreover, high relationship satisfaction appeared to be a protective factor against stopping sexual activity, even when women experienced vaginal symptoms related to menopause. Given the high relevance of sexual side effects of RRSO on patient satisfaction with surgery [3,4], these findings suggest that relationship satisfaction is an important clinical issue to address with women considering prophylactic surgical intervention for ovarian cancer.

Specifically, the results from this study suggest that disturbances in sexual activity, a common concern for women considering RRSO [3], is a more prominent side effect of RRSO for women with low baseline relationship satisfaction. In medically healthy samples, women who report low relationship satisfaction are more likely to be distressed by sexual dysfunction [27] and to attribute low sexual desire to interpersonal, not biological, factors [28]. In contrast, when women report high relationship satisfaction, they are less likely to have distress regarding problems with physiologic sexual function such as lubrication [29]. It is likely that in our sample, women with high relationship satisfaction experienced perturbations of physical sexual function due to menopausal effects as temporary and not reflective of intractable problems in the intimate relationship. Interestingly, although some of these women experienced changes in their sexual frequency (e.g. temporarily stopped having sex), their relationship satisfaction did not change significantly over time, suggesting that for this sample, relationship quality was not dependent on sexual activity.

Our findings fit with other research in the area. For example, van Oostrom et al. [30] reported that although up to 70% of women who underwent bilateral salpingo-oophorectomy and/or prophylactic mastectomy expressed some long-term change in their sexual relationship, women with cancer risk did not differ from a healthy control group in measures of general sexual functioning. The women in their sample reported very high relationship satisfaction overall [31], further supporting the notion that relationship satisfaction is a key factor in predicting sexual activity and function following RRSO.

Interestingly, we did not find that mental health variables predicted sexual activity before or after RRSO. As this was not a psychiatric population, the participants in our sample reported (generally) low-levels of depression and anxiety (except for anxiety specific to cancer risk (McGregor, Charbonneau, Ceballos, Barhart, Fann, Paley, Swisher, Unpublished Data, March 2014)); it is possible that among women with high-levels of psychopathology, symptoms of depression or anxiety would have a more significant association with frequency of sexual activity. Similarly, except for cancer risk, women in our sample reported generally good physical health and thus our measure of physical health did not have

much power as a predictor of sexual activity. Nevertheless, it is telling that in the presence of relationship satisfaction, no other variable significantly predicted sexual activity following RRSO, including age, menopausal symptoms or type of surgery performed.

The most important clinical implication of our findings is the need to prospectively assess relationship satisfaction in women considering RRSO. Those women who have high relationship satisfaction may be comforted by the knowledge that they are less likely to experience sexual side effects following surgery. Those with low relationship satisfaction may benefit from a referral for couples counseling or other psychosocial support to reduce their risk of sexual problems following RRSO. Several studies have suggested that pre-surgical counseling can reduce the risk of sexual side effects, particularly for women undergoing RRSO with hysterectomy [9]. Such pre-surgical counseling can include setting realistic expectations for patients and their partners on recovery timelines, encouraging proactive communication with clinicians regarding sexual concerns. Many patients – and even clinicians – forget the impact of good diet, exercise, stress management, and good communication skills on sexual wellbeing, particularly in the context of gynecologic cancer. Finally, clinicians caring for women following RRSO may handle the sexual side effects of surgery with a comprehensive biopsychosocial approach, including both the patient and her partner in education and treatment.

There were a few limitations in the present study. As this was a secondary analysis, we had to use only data previously collected and thus did not have access to a validated measure of sexual function, only sexual activity. In our sample, about 64% of women reported sexual activity at every time point, while only 7% reported completely stopping sexual activity. In contrast, Fang et al. [8] found that 12 months following surgery, approximately 46% of women reported frequency of sexual activity was “about the same as usual” while 40% reported sexual frequency was “less than usual”. Our dichotomous scale (sexual activity at least once in the past month versus no sex) may have delivered a less fine grained analysis as Fang et al. [8]. It is possible that some of the women who continued to engage in sexual activity experienced significant reduction in frequency, but as they had at least *some* activity, they were classified as unchanged. Thus, our analyses reflect the most extreme cases, e.g. those women who discontinued sex altogether. Further research may use more fine-grained measures that capture sexual function and tease apart the bidirectional relationship between relationship satisfaction and sexuality. For example, measures such as the Female Sexual Function Index (FSFI) have been shown to differentiate low sexual satisfaction from sexual distress in cancer populations [26]. Also, although our findings suggest a distinction between sexual activity and relationship satisfaction as scientific constructs, women’s assessment of their relationship satisfaction may take into account recent changes in sexual activity. That is, because we did not specifically ask women to consider only their emotional or non-sexual aspects of their relationship, they may have based some of their assessment of relationship satisfaction on the presence or absence of sexual activity. Although our findings suggest that women’s relationship satisfaction may remain stable even as sexual activity varies, this may be due to consideration of sexual activity as a dichotomy. Further analyses of frequency of sexual activity (rather than simply the presence or absence) may reveal the *degree* to which ratings of relationship satisfaction

are determined by sexual activity. Our sample was predominantly white and non-Hispanic, limiting the generalizability to women of color. Similarly, many of the women in the present sample had a hysterectomy as well as RRSO; although we controlled for surgery type in our analyses, hysterectomy can have an independent effect on sexual wellbeing [9]. Finally, our study lacked a non-surgery control group. To confirm that these findings are not due solely to naturalistic changes in sexual activity, we would need to compare women who do and do not undergo RRSO.

The present study examined predictors of changes in sexual activity following prophylactic salpingo oophorectomy. We found that, contrary to our expectations, measures of mental and physical health did not predict sexual activity. However, relationship satisfaction did, such that women with high relationship satisfaction were more likely to continue to engage in regular sexual activity following RRSO, even when they also experienced high levels of vaginal menopausal symptoms. Clinicians counseling women deciding whether or not to undergo RRSO may reassure patients that rather than physical changes following surgery, the most important predictor of their sexual well-being is likely their satisfaction in their relationship.

Acknowledgments

This research was conducted with financial assistance from a Fred Hutchinson Cancer Research Center/University of Washington Consortium Pilot Fund Award, supported by the National Institutes of Health Cancer Center Support Grant 5P30 CA015704-31 (Hartwell). The first author is also supported by grant T32HD049336-09 from the National Institute of Child Health and Human Development.

References

1. Incidence and Mortality Web-based Report. Atlanta (GA): Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2013. United States Cancer Statistics: 1999–2009. U.S. Cancer Statistics Working Group
2. Rebbeck TR, Kauff ND, Domchek SM. Meta-analysis of risk reduction estimates associated with risk-reducing salpingo-oophorectomy in BRCA1 or BRCA2 mutation carriers. *J Natl Cancer Inst.* 2009; 101:80–7. [PubMed: 19141781]
3. Madalinska JB, Hollenstein J, Bleiker E, et al. Quality-of-life effects of prophylactic salpingo-oophorectomy versus gynecologic screening among women at increased risk of hereditary ovarian cancer. *J Clin Oncol.* 2005; 23:6890–8. [PubMed: 16129845]
4. Hallowell N, Baylock B, Heiniger L, et al. kConFab Psychosocial Group on behalf of the kConFab Investigators. 2012. Looking different, feeling different: women's reactions to risk-reducing breast and ovarian surgery. *Familial Cancer.* 2012; 11:215–24. [PubMed: 22198037]
5. Robson M, Hensley M, Barakat R, et al. Quality of life in women at risk for ovarian cancer who have undergone risk-reducing oophorectomy. *Gynecol Oncol.* 2003; 89:281–7. [PubMed: 12713992]
6. Madalinska JB, van Beurden M, Bleiker EMA, et al. The impact of hormone replacement therapy on menopausal symptoms in younger high-risk women after prophylactic salpingo-oophorectomy. *J Clin Oncol.* 2006; 24:3576–82. [PubMed: 16877724]
7. Finch A, Metcalfe K, Chiang J, et al. The impact of prophylactic salpingo-oophorectomy on menopausal symptoms and sexual function in women who carry a BRCA mutation. *Gynecol Oncol.* 2011; 121:163–8. [PubMed: 21216453]
8. Fang CY, Cherry C, Devarajan K, et al. A prospective study of quality of life among women undergoing risk-reducing salpingo-oophorectomy versus gynecologic screening for ovarian cancer. *Gynecol Oncol.* 2009; 112:594–600. [PubMed: 19141360]

9. Bradford A, Meston CM. Sexual outcomes and satisfaction with hysterectomy: influence of patient education. *J Sex Med.* 2007; 4:106–14. [PubMed: 17087803]
10. Michelsen TM, Dørum A, Dahl AA. A controlled study of mental distress and somatic complaints after risk-reducing salpingo-oophorectomy in women at risk for hereditary breast ovarian cancer. *Gynecol Oncol.* 2009; 113:128–33. [PubMed: 19178933]
11. Barlow DH. Causes of sexual dysfunction: the role of anxiety and cognitive interference. *J Consult Clin Psychol.* 1986; 54:140. [PubMed: 3700800]
12. Baldwin DS. Depression and sexual dysfunction. *Br Med Bull.* 2001; 57:81–99. [PubMed: 11719925]
13. Pujols Y, Meston CM, Seal BN. The association between sexual satisfaction and body image in women. *J Sex Med.* 2010; 7:905–16. [PubMed: 19968771]
14. Leiblum SR, Koochaki PE, Rodenberg CA, et al. Hypoactive sexual desire disorder in postmenopausal women: US results from the Women's International Study of Health and Sexuality (WISHeS). *Menopause.* 2006; 13:46–56. [PubMed: 16607098]
15. Bellerose SB, Binik YM. Body image and sexuality in oophorectomized women. *Arch Sex Behav.* 1993; 22:435–59. [PubMed: 8239974]
16. McNulty JK, Fisher TD. Gender differences in response to sexual expectancies and changes in sexual frequency: a short-term longitudinal study of sexual satisfaction in newly married couples. *Arch Sex Behav.* 2008; 37:229–40. [PubMed: 17641964]
17. Murray ML, Cerrato F, Bennett RL, Jarvik GP. Follow-up of carriers of BRCA1 and BRCA2 variants of unknown significance: variant reclassification and surgical decisions. *Genet Med.* 2011; 13:998–1005. [PubMed: 21811163]
18. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977; 1:385–401.
19. Orme JG, Reis J, Herz EJ. Factorial and discriminant validity of the center for epidemiological studies depression (CES-D) scale. *J Clin Psychol.* 1986; 42:28–33. [PubMed: 3950011]
20. Spielberger, CD.; Gorsuch, R.; Lushene, R., et al. Manual for the state-trait anxiety inventory. Palo Alto, CA: Consulting Psychologists; 1983.
21. Oei TP, Evans L, Crook GM. Utility and validity of the STAI with anxiety disorder patients. *Br J Clin Psychol.* 2011; 29:429–32. [PubMed: 2289078]
22. Ware JE Jr, Kosinski M, Bayliss MS, et al. Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the Medical Outcomes Study. *Med Care.* 1995; 33:AS264–79. [PubMed: 7723455]
23. Ganz PA, Day R, Ware JE, et al. Base-line quality-of-life assessment in the national surgical adjuvant breast and bowel project breast cancer prevention trial. *J Natl Cancer Inst.* 1995; 87:1372–82. [PubMed: 7658498]
24. Greendale GA, Reboussin BA, Hogan P, Barnabei VM, Shumaker S, Johnson S, Barrett-Connor E. Symptom relief and side effects of postmenopausal hormones: results from the Postmenopausal Estrogen/Progestin Interventions Trial. *Obstet Gynecol.* 1998; 92:982–8. [PubMed: 9840563]
25. Alfano CM, McGregor BA, Kuniyuki A, et al. Psychometric properties of a tool for measuring hormone-related systems in breast cancer survivors. *Psycho-Oncology.* 2006; 15:985–1000.
26. Lorenz, T.; Stephenson, KR.; Meston, CM. Validated questionnaires in female sexual function assessment. In: Mulhall, JP.; Incrocci, L.; Goldstein, I.; Rosen, RC., editors. *Cancer and sexual health.* New York: Humana Press; 2011. p. 317-37.
27. Stephenson KR, Meston CM. Differentiating components of sexual well-being in women: are sexual satisfaction and sexual distress independent constructs? *J Sex Med.* 2010; 7:2458–68. [PubMed: 20456625]
28. Sims KE, Meana M. Why did passion wane? A qualitative study of married women's attributions for declines in sexual desire. *J Sex Marital Ther.* 2010; 36:360–80. [PubMed: 20574890]
29. Stephenson KR, Meston CM. When are sexual difficulties distressing for women? The selective protective value of intimate relationships. *J Sex Med.* 2010; 7:3683–94. [PubMed: 20701676]
30. van Oostrom I, Meijers-Heijboer H, Lodder LN, et al. Long-term psychological impact of carrying a BRCA1/2 mutation and prophylactic surgery: a 5-year follow-up study. *J Clin Oncol.* 2003; 21:3867–74. [PubMed: 14551306]

31. Lodder LN, Frets PG, Trijsburg RW, et al. One year follow-up of women opting for presymptomatic testing for BRCA1 and BRCA2: emotional impact of the test outcome and decisions on risk management (surveillance or prophylactic surgery). *Breast Cancer Res Treat.* 2002; 73:97–112. [PubMed: 12088120]

- Current knowledge on this subject
 - Sexual problems are commonly reported in women who have undergone prophylactic salpingo oophorectomy, and a strong predictor of dissatisfaction with surgery.
 - In naturally menopausal women, relationship satisfaction is a stronger predictor of sexual dysfunction than symptoms related to menopausal transition (e.g. vaginal dryness).
- What this study adds
 - Prospective measurement of sexual activity, relationship satisfaction, and physical and mental health before and after salpingo oophorectomy.
 - Description of predictors of changes in sexual activity following salpingo oophorectomy (although changes are commonly reported, little is known about risk factors or protective factors).
 - Confirmation that relationship satisfaction is the strongest predictor of sexual activity following surgical menopause, above and beyond physical symptoms.

Figure 1.
Interaction between relationship satisfaction and vaginal symptoms in predicting change in sexual activity post-surgery.

Table 1Demographics of present sample (total $n = 85$).

	<i>n</i>	%
Non-Hispanic White	78	91.80%
Married/living with partner	82	96.50%
Have children	70	82.40%
Pre-menopausal at baseline	35	41.20%
RRSO with hysterectomy	70	82.70%
HRT at baseline	9	10.50%
HRT 2 months post-surgery	19	22.10%
HRT 6 months post-surgery	21	24.40%
HRT 12 months post-surgery	21	24.40%
	Mean	SD
Age	48.08	7.71
Years of education	15.71	2.58

Table 2

Predictors of sexual activity following RRSO.

	Baseline	6 months post-surgery	12 months post-surgery
Final model ($\chi^2(4)$)	10.86	4.49	22.33
Significance (p)	0.05	0.18	0.00
Classification ¹ (%)	81.00	81.10	85.7
Predictors (B) (Constant)	1.57	2.70	0.12
Age	-0.06	-0.07	-0.13*
Pre-menopausal ²	-0.42	–	–
Menopausal	0.25	–	–
Hormone replacement therapy ³	-0.65	-0.49	-0.28
Hysterectomy ⁴	–	-0.58	1.66
Relationship satisfaction	0.60**	0.59*	10.59**

¹ % observed data correctly classified into intercourse/no intercourse group.

² Menopausal status was entered categorically, with pre-menopausal status as the comparator.

³ Hormone replacement therapy (1); no hormone replacement therapy (0).

⁴ Hysterectomy (0); patient kept uterus (1).

* $p < 0.05$

** $p < 0.01$.

Note: All variables tested at the 2-month post-surgery model were non-significant.