Hypoactive sexual desire disorder in menopausal women: a survey of western european women

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Abstract

Introduction. The prevalence of hypoactive sexual desire disorder (HSDD) in menopausal women and the frequency of sexual activity, sexual behavior, and relationship or sexual satisfaction associated with HSDD have not been studied using validated instruments to identify women with HSDD.
Aims. To determine: (i) the prevalence of HSDD among women who have undergone hysterectomy and bilateral oophorectomy (surgical menopause) with that of premenopausal or naturally menopausal women; (ii) the relationship between low sexual desire and sexual activity and behavior; and (iii) the relationship between low sexual desire and sexual or partner relationship satisfaction.
Methods. Cross-sectional survey of 2,467 European women aged 20-70 years, resident in France, Germany, Italy, and the United Kingdom. Measures were the Profile of Female Sexual Function$^©$ (PFSF$^©$), Personal Distress Scale$^©$ (PDS$^©$), and a sexual activities measure.
Outcome Measures. Clinically derived cutoff scores for the desire domain of the PFSF and the PDS were used, sequentially, to classify women as having low sexual desire and to further classify these women with low desire as distressed or nondistressed. Thus, women with HSDD had low sexual desire and were distressed by their low desire. The analysis population included 1,356 women who had current sexual partners and were surgically menopausal, regularly menstruating, or naturally postmenopausal.
Results. A greater proportion of surgically menopausal women had low sexual desire compared with premenopausal or naturally menopausal women (odds ratio [OR] = 1.4; confidence interval [CI] = 1.1, 1.9; P = 0.02). Surgically menopausal women were more likely to have HSDD than premenopausal or naturally menopausal women (OR = 2.1; CI = 1.4, 3.4; P = 0.001). Sexual desire scores and sexual arousal, orgasm, and sexual pleasure were highly correlated (P<0.001), demonstrating that low sexual desire is frequently associated with decreased functioning in other aspects of sexual response. Women with low sexual desire were less likely to engage in sexual activity and more likely to be dissatisfied with their sex life and partner relationship than women with normal desire (P<0.001).
Conclusions. Surgically menopausal women are at increased risk for HSDD. HSDD is associated with diminished sexual and partner relationship satisfaction and negative emotional states.

Introduction

The last decade has seen a resurgence of scientific interest in female sexual functioning. Researchers and clinicians have worked together to develop definitions of female sexual dysfunction based on the different domains of female sexual functioning (desire, arousal, orgasm) and sexual pain [1]. Hypoactive sexual desire disorder (HSDD) is defined as the persistent or recurrent deficiency of sexual fantasies/thoughts, and/or desire for, or receptivity to, sexual activity that causes personal distress [1]. An important component of the definitions is that of personal distress, which must be present before a diagnosis of dysfunction can be concluded. The

presence of distress thus helps to separate those women with low levels of sexual functioning on any domain who are not distressed and do not have a disorder from those whose low level of sexual functioning is a disorder.

Refining the definitions of female sexual dysfunction has spurred the development and validation of new instruments to measure different aspects of female sexual functioning and any associated distress [2–4]. These tools enable assessment of the prevalence of specific types of female sexual dysfunction, identification of associated factors, and evaluation of therapeutic interventions as these are developed.

The role of hormonal factors in female sexual functioning has been the subject of much debate. Of particular interest have been the roles of estradiol and testosterone in female sexual desire. Research strategies include those of observational epidemiological studies to identify patients for inclusion in later double-blind randomized clinical trials. Observational studies have focused on determining whether sexual functioning changes in parallel with changing ovarian hormonal patterns such as the menstrual cycle, postpartum, and the menopausal transition. The last of these reproductive phases has been the most studied [5–11]. A number of methodological problems beset this area, including those of the lack of clear delineation of reproductive phase, failure to use validated instruments to assess female sexual function, the sensitivity of hormone measures, and sample and recall biases. A major problem is that of the confounding of reproductive phase with age and length of relationship. Both have been shown to have significant negative effects on female (and male) sexual functioning [5].

A recent review of observational studies of the natural menopausal transition found evidence for an incremental effect of the menopausal transition (over that of age) on most domains of female sexual functioning [5]. The Melbourne Women's Midlife Health Project, a longitudinal populationbased study, found that as women passed through the natural menopausal transition there were significant decreases in women's desire, arousal, orgasm, and frequency of sexual activities, and increasing vaginal dryness/dyspareunia [11]. These changes were significantly related to declining estradiol levels [12] with prior function and relational factors having greater effect than hormonal factors [13]. The changes were not related to testosterone levels [12]; there were no signifi- cant changes in testosterone levels with natural menopause. Testosterone levels begin to decline in women from the third decade, so that women in their 40s have about half the testosterone of women in their 20s [14]. Aging, however, has substantial effects on androgen levels [15]. Bilateral oophorectomy leads to an approximately 50% fall in circulating levels of testosterone in both the premenopausal and postmenopausal woman [16]. Thus, women who have undergone bilateral oophorectomy may experience more adverse effects on sexual functioning due to the combined loss of estradiol and testosterone.

Our study uses a nested control model to examine the impact of surgical menopause on women's sexual functioning. As female sexual function has been shown to decline with age [17] and natural menopause [5], we chose to compare the sexual functioning of women who have undergone hysterectomy with bilateral oophorectomy (surgical menopause) with that of nonoophorectomized women in age-appropriate reproductive phases. Thus, younger surgical menopause women aged 20-49 years are compared with (premenopausal) women in the same age group who are still menstruating regularly, and surgically menopausal women aged 50–70 years are compared with women in the same age group who have reached a natural menopause.

Methods

Study Design
Data were made available from the Women's International Study of Health and Sexuality (WISHeS), a cross-sectional study utilizing a large market research database. The WISHeS was conducted in 1999-2000 among over 4,517 women, aged 20-70 years, and resident in the United States, France, Germany, Italy, and the United Kingdom. The study was carried out in the United States by the NPD Group (acquired by the IPSOS Group in 2001) and by the GfK Group (headquarters in Nürnberg, Germany) in Europe. This article will focus on women from the four European countries (N = 2,467). In France, Germany, and the United Kingdom, women were recruited from GfK's database, which was supplemented with consumer lists purchased from other suppliers. Women in the database and the additional consumer lists had agreed to be contacted about research opportunities on a variety of topics and healthcare. Women in the appropriate age range were sent a letter informing them that a national research study on women's health issues containing some questions of a sensitive nature was going to be conducted and that they would be contacted by telephone to determine their interest in participating in the research. When contacted by telephone, women were asked their ages and a brief

series of questions regarding their reproductive status and their usage of hormone therapy (HT). Those who were qualified and agreed to participate were sent the survey to complete and return by mail. In Italy, women were contacted randomly door-to-door to inform them of a national research study being conducted on women's health issues including some questions of a sensitive nature. These women were asked the same questions as the women in the other European Union countries to determine whether they qualified and were interested in participating in the study. The questionnaire was left with those women who qualified and agreed to participate, and was picked up at their homes at a later date. Overall, approximately 70% of women who received the survey completed and returned it.

Study Population
Inclusion criteria for invitation to participate in the European WISHeS were: aged 20-70 years; residency in France, Germany, Italy, or the United Kingdom; and literacy in the language of the country in which they lived. Women were also recruited by reproductive status to achieve a sample size of at least 100 women of seven groups classified by reproductive phase: (i) younger surgical menopause (hysterectomy with bilateral oophorectomy) women, aged 20-49; (ii) older surgical menopause (hysterectomy with bilateral oophorectomy) women, aged 50-70; (iii) regularly menstruating (premenopausal) women aged 20-49; (iv) perimenopausal women, menstruating irregularly and aged 36–49; (v) naturally postmenopausal women, no menses for 12 months, aged 50-70; (vi) hysterectomized women without oophorectomy, aged 20-49; and (vii) hysterectomized women without oophorectomy, aged 50-70. This article focuses on the two groups of surgically menopausal women, all of whom had undergone bilateral oophorectomy, and contrasts these with premenopausal or naturally menopausal women in the age-appropriate reproductive phases. The younger surgically menopausal women, aged 20-49, were compared with the premenopausal, regularly menstruating women, aged 20-49. The older surgically menopausal women, aged 50-70, were compared with the naturally postmenopausal women, aged 50-70.

Outcome Measures
Women completed the WISHeS survey questionnaire and returned it by mail, except in Italy where the survey was picked up at their homes. All questionnaires were supplied in the primary language of the country concerned. The questionnaire included three sections: Section I: General Health; Section II: Hormone Replacement & Menopause; and Section III: Sexuality & Relationships. Each section contained at least one validated quality of life instrument or scale. This article utilizes the information from Section II that enabled women to be classified into the reproductive phase groups described above, and information from Section III on sexual functioning. Section II included questions on menstrual status, experience of gynecological surgical interventions, and use of HTs including the oral contraceptive pill and menopausal HT. Women were specifically asked to indicate whether the uterus was removed and whether one or both ovaries were removed. Women were asked to indicate whether their menses were regular, irregular, or had ceased for more than 12 months. They were also given an opportunity to classify themselves as menopausal.
Section III included questions on the following parameters of sexual functioning:
1. Frequency of sexual activities: the frequency of different types of sexual activities in the prior 30 days (self-initiated, partner initiated, masturbation, intercourse, orgasm).
2. Satisfaction with partner relationships and sex life in the past 30 days.
3. The Profile of Female Sexual Function© (PFSF©) is a self-report, validated questionnaire developed to measure aspects of sexual function in menopausal women with low sexual desire. The PFSF consists of 37 items and 7 domains. Domains of particular interest to this research were sexual desire, sexual arousal, pleasure, and orgasm. For each item of the PFSF, women were asked to indicate how often in the past 30 days a series of items applied to them, using a six-point categorical scale: always (1), very often (2), often (3), sometimes (4), seldom (5), or never (6). Domain scores were computed as the average of all items within the domain. Scores were then transformed to a 0– 100 scale so that the score reflected the percentage of the total possible score achieved. Prior to averaging, positively worded items were reverse-scored so that low domain scores represented low sexual function [18,19].
4. Personal Distress Scale© (PDS©) is a sevenitem, self-report scale developed to measure distress due to lack of sexual desire. The same response scale and scoring algorithm were used for the PDS as described above for the PFSF. The scores for all items were reversed prior to averaging so that a high domain score represents high distress [16].

Classification of Women with Low Desire and Associated Distress

Cutoff scores on the PFSF desire domain and the PDS to enable the classification of women as having low desire and being distressed by their low desire were determined from clinical studies conducted to develop and validate these instruments [18–20]. These clinical studies enrolled surgically and naturally menopausal women with HSDD using criteria consistent with the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) definition of the condition; that is, women had to report having a satisfying sex life before menopause (either surgical or natural), with a meaningful loss in desire and decrease in sexual activity after menopause, and to be experiencing concern over their decreased level of desire for sexual activity. A group of age-matched control women with intact ovaries and normal sexual desire was also enrolled. All of these women characterized their sex life as good, were content with their current level of sexual activity, and were not concerned about their level of interest in sex. A receiver operating characteristic (ROC) analysis in conjunction with clinical judgment was used to identify the PFSF sexual desire domain score and the PDS score that correctly classified the greatest proportion of women. More specifically, the ROC analysis [21] entailed computing, for each potential cutoff, the percentages of HSDD and control women classified as such based on that cutoff. The final scores used for classification corresponded to the cutoff values that classified correctly the greatest proportion of women [19,20].

Based on the ROC analysis, a score of less than 40 on the PFSF sexual desire domain was found to optimally classify menopausal women as having low sexual desire. A score of 40 corresponds to a response, on average, of "sometimes" to items like "I felt sexual desire." Hence, women who responded less than "sometimes" (i.e., "seldom" or "never") on average would be classified as having low sexual desire. A score of less than 60 on the PDS was found to optimally classify women with low desire as distressed. A score of 60 corresponds to a response, on average, of "sometimes" to items such as "I felt concerned about my lack of sexual desire." Hence, women who expressed concern "often," "very often," or "always" on average were considered to be distressed about their low sexual desire and were classified as having HSDD.

Statistical Analysis

The analysis population consisted of four groups: surgically menopausal women aged 20–49, surgically menopausal women aged 50–70, premenopausal women aged 20–49, and naturally postmenopausal women aged 50–70, all of whom returned the survey and reported that they had a current sexual partner. Demographic characteristics across the four reproductive groups were summarized using descriptive statistics. Formal statistical tests, using the two-sample *t*-test and chi-square test as appropriate, were performed to determine whether the demographic characteristics of surgically menopausal and intact women differed within each age group.

The relationship between sexual desire and sexual arousal, orgasm, and pleasure within each of the four reproductive groups was assessed visually using scatter plots. The Pearson's product– moment correlation coefficient was calculated and a linear regression line was superimposed over the scatter plot in order to quantify the association.

The impact of having low sexual desire on the frequency of sexual activity during the last 30 days was examined by calculating descriptive statistics for each group. Within each reproductive group, the difference in average sexual activity between women with and without low sexual desire was compared using the Wilcoxon rank-sum test and two-sample *t*-test, with the former test being of primary importance due to the skewness of the observed data.

Women were categorized into two subgroups depending on their sexual desire and distress status: HSDD (distressed associated with low sexual desire) and normal sexual desire (without low desire or distress).

The odds of being classified as having HSDD or normal sexual desire were compared between surgically menopausal and premenopausal or naturally menopausal women using a logistic regression model adjusting for age as a continuous covariate and HT status as a binary variable.

The impact of having HSDD on a woman's satisfaction with her sex life, and satisfaction with the partner relationship was assessed using descriptive (number and percent) and formal statistics (i.e., chi-square test).

All statistical analyses were performed using SAS statistical software, version 8.02 (SAS Institute Inc., Cary, NC, USA).

Results

Study Population Demographics
Of the 2,467 women who returned the survey, 1,685 (68%) were premenopausal (regularly menstruating), surgically menopausal, or naturally postmenopausal women as defined above and were aged 20–70 years. The 782 women excluded from this analysis were women with hysterectomies without oophorectomy or women who were perimenopausal. Among the remaining 1,682 women, 1,356 women had a current sexual partner and are the basis of this publication (Table 1 summarizes the demographic characteristics of these women). Within each age group, surgically menopausal women were older (20-49 years: $F_{1,\infty} = 203.3$, $P < 0.001$; 50-70 years: $F_{1,\infty} = 3.5$, $P = 0.062$) and more likely to be using HT (20-49 years: $X^2_1 = 312.7$, $P < 0.001$; 50-70 years: $X^2_1 = 37.5$, $P < 0.001$) than naturally menopausal women. As expected, premenopausal women aged 20-49 years were more likely to have taken oral contraception ($X^2_1 = 56.4$, $P < 0.001$) than their surgically menopausal counterparts. After adjusting for age, there were no statistically significant differences in marital status or length of time with sexual partner when surgically menopausal women were compared with their age-appropriate, reproductive-status control groups.

Prevalence of Low Sexual Desire
Table 2 displays the prevalence of low sexual desire among women by reproductive status and age. The percentage of women with low desire ranged from 16% of premenopausal women (aged 20-49) to 46% of surgically menopausal women aged 50–70. The odds of having low sexual desire were significantly greater for surgically menopausal than premenopausal or naturally postmenopausal women (odds ratio [OR] = 1.4; 95% confidence interval [CI] = 1.1, 1.9; $X^2_1 = 5.5$; $P = 0.019$).
When the prevalence of low sexual desire was determined for HT users and nonusers, the likelihood of experiencing low desire was significantly less among HT users (OR = 0.6; 95% CI = 0.4, 0.8; $X^2_1 = 9.3$; $P = 0.002$).

Prevalence of HSDD
Women with low desire in each reproductive group were further classified as distressed or nondistressed using a cutoff score on the PDS to determine the percentages of women with low desire who were also distressed (Table 2).
The prevalence of HSDD in each reproductive group was determined from the number of women with low desire who were distressed in each group as compared with the total number of women in each group (Table 2). Among women 20-49 years, the prevalence of HSDD was 7% (40/597) for premenopausal women and 16% (23/146) for surgically menopausal women; the prevalence among women 50–70 years was 9% (26/288) for naturally postmenopausal women and 12% (30/248) for surgically menopausal women. The odds of having HSDD were significantly higher for women who had undergone a surgical menopause as compared with nonsurgical women (premenopausal and naturally menopausal women) (OR = 2.1; 95% CI = 1.4, 3.4; $X^2_1 = 10.9$; $P = 0.001$). When the prevalence of HSDD was determined for HT users and nonusers, the likelihood of experiencing HSDD was significantly less among HT users (OR = 0.5; 95% CI = 0.3, 0.9; $X^2_1 = 4.9$; $P = 0.027$).

Correlation of Sexual Desire and Arousal or Orgasm Scores on the PFSF
Table 3 summarizes the association of sexual desire scores with other domains of sexual functioning including arousal, orgasm, or pleasure. Regardless of age or reproductive status, a strong positive statistically significant relationship was observed between the desire score and each of these other domains ($P<0.001$). Taking into account the four reproductive groups or strata, the Pearson's partial correlation coefficients assessing the strength of linear association between sexual desire and sexual arousal, orgasm, and sexual pleasure were 0.63, 0.53, and 0.75, respectively.

Sexual Desire Status and Frequency of Sexual Activity
Table 4 summarizes the average frequency of various sexual activities reported in the past 30 days by women with low or normal sexual desire. Regardless of reproductive status and age group, women with low sexual desire reported signifi- cantly less frequent self-initiated sex, partnerinitiated sex, intercourse, and orgasm than women with normal levels of sexual desire ($P < 0.007$, Wilcoxon rank-sum test).
As the relationship between sexual desire level and sexual activity was similar across reproductive status and age groups, the data for the four reproductive groups were pooled to study the relationship between sexual desire score and frequency of various sexual activities. Figure 1 shows that as the PFSF sexual desire domain scores increased, the frequency of sexual activity increased. At very low levels of sexual desire, women initiated

sexual activity, achieved orgasm, or masturbated rarely, if at all. The frequency of sexual activity was low and relatively flat below the desire domain cutoff score of 40 and increased significantly above the cutoff score.

Association of HSDD with Lower Sexual and Relationship Satisfaction
The association between HSDD and a woman's perceived satisfaction with her sex life and her relationship was explored (Table 5). Although women generally were satisfied with their sex lives and their partner relationships, women with HSDD were significantly more likely to feel dissatisfied with their sex life than women with normal desire ($X^2_1 = 418.0$; $P < 0.001$). Women with HSDD were also more likely to feel dissatisfied with their relationship than women with normal desire ($X^2_1 = 109.7$; $P < 0.001$).

Negative Emotional and Psychological Statements Endorsed by Women with HSDD
Women with HSDD were significantly more likely ($P < 0.001$) than women with normal desire to endorse negative emotions or psychological states (Table 6). These results confirm that women with HSDD experience distress because of their low sexual desire. The most frequently endorsed statement by HSDD women is that of "letting my partner down," indicative of their concern about the negative effects that low desire can have on the couple's intimate relationship.

Discussion

In this study, the percentage of women across four Western European countries classified with low sexual desire ranged from 16% of regularly menstruating (premenopausal) women to 29% of surgically menopausal women of the same age group (aged 20-49) and from 42% of naturally menopausal women aged 50-70 to 46% of older surgic cally menopausal in the same age range. In order for women with low desire to be classified as having HSDD, they must experience distress due to low sexual desire. Using the validated PDS scale, the percentage of European women with HSDD in this study population ranged from 7% of regularly menstruating (premenopausal) women to 16% of the surgically menopausal women in the same age group (20-49 years).

Varying results for the proportion of women with low sexual desire and/or distress have been reported by other studies using a variety of questions to identify women with low desire and associated distress [22–25]. In a study on the prevalence of sexual disabilities conducted among 1,335 Swedish women, aged 18–74, women were asked how often in the past 12 months they experienced decreased interest in sex [22]. Thirty-three percent of women responded "quite often," "nearly all the time," or "all the time" and were defined as having manifest low desire. An additional question was asked on how often their low desire was a problem. Forty-three percent of women with manifest low desire responded that this was a problem for them "quite often," "nearly all the time," or "all the time"; these women were said to be distressed. Thus, about 14% of all women in the Fugl-Meyer and Fugl-Meyer study reported low desire that was problematic or distressing. Despite potential ambiguity in the word- ing of the questions in their study, similar results on the prevalence of HSDD were found in the present study. The present study is the first to use validated measures of sexual functioning and distress due to low sexual desire.

Women with low sexual desire and HSDD were identified in all reproductive groups studied. However, surgically menopausal women were more likely to have both low sexual desire and associated distress. Thus, women of any age group who have had bilateral oophorectomy are more likely to meet the criteria for HSDD than their reproductive-aged counterparts.

While this article has focused on the desire domain of female sexual functioning, there was significant correlation of desire with other domains of female sexual functioning, including sexual arousal, orgasm, and sexual pleasure. Women with low desire are also highly likely to experience low arousal, pleasure, or orgasmic dif- ficulties. Overall, the results show that women with low desire have, on average, a very different sexual experience than women without low sexual desire. HSDD is significantly associated with dissatisfaction with sex life and the partner relationship. These findings indicate that restoring a woman's sexual desire may help to improve her satisfaction with her own sexual functioning and with the intimate relationship between her and her sexual partner.

Strengths of the WISHeS study include the use of patient-centered, comprehensively validated measures of female sexual functioning that are specifically designed to measure HSDD; a large sample size; concurrent conduct in multiple European countries, eliminating cohort effects; and the ability to assess the effects of loss of ovarian functioning on female sexual function.

There are a number of limitations of the present study. The classification into HSDD is based on questionnaires. No diagnostic interview was carried out. While limited by use of questionnaires it should be noted that most epidemiological studies of sexual dysfunction have not used such detailed, well-validated tools. The study population was a convenience sample of women who were willing to take part in marketing surveys, and there were some differences in recruiting methods between countries. In Italy, women were recruited in-person in their homes, while women in other countries were contacted by telephone. Differences between participants and nonparticipants were not studied. A high percentage of participants were Caucasian and further research is required to confirm these findings in other racial or ethnic groups. Hysterectomy itself may impact female sexual functioning adversely due to anatomical effects of surgery itself or indirect effects on ovarian hormones [26,27]. Hysterectomy may also have beneficial effects on sexual functioning due to the removal of pathology that itself impacted adversely on sexual functioning. For these reasons we chose not to include an hysterectomy (without oophorectomy) group in the present analyses.

Potential confounding effects on sexual functioning associated with surgical procedures include pathology (if any) that leads to bilateral oophorectomy, anatomical effects of the surgery, or effects of other treatments since surgery. These treatments may include the use of chemotherapy or irradiation for malignancies, or the use of HTs. Another confounding factor is that estrogen levels decline significantly with oophorectomy in premenopausal women [27], necessitating a subgroup analysis comparing estrogen-replete women in each group. In the present study women using HT were less likely to be classified with low desire than nonusers while the proportion with HSDD was not affected by HT usage. This suggests that HT usage may improve a woman's sexual function, for example, by decreasing vaginal dryness, and decrease the likelihood of her being classified with low desire. However, HT has no effect on distress and a woman on HT with low desire is just as likely as a nonuser to be distressed and have HSDD. Several studies have demonstrated positive effects of estrogen on sexual function in surgically menopausal women and additional improvement when estrogen-replete women are given testosterone [28,29]. Oral estrogen therapy can increase circulating concentrations of sex hormone-binding globulin, resulting in even lower concentrations of free testosterone [27]. For the naturally postmenopausal women, any of the HTs may reduce the production of testosterone by intact ovaries by suppressing luteinizing hormone [30]. Thus, HT use in the present study may not have been optimal in restoring endocrine parameters. Unfortunately, hormone levels could not be measured in the WISHeS.

Despite these potential confounding factors, a number of other observational studies, both crosssectional and longitudinal, have suggested that surgical menopause involving bilateral oophorectomy has a greater negative impact on sexual functioning than an hysterectomy. The prospective Maryland Women's Health Study found that compared with women who had an hysterectomy, women who had bilateral oophorectomy were significantly more likely to be anorgasmic 12 months postoperatively [31]. A retrospective Swedish study of 678 women aged below 55 who had a hysterectomy for benign disease found that women who also underwent bilateral oophorectomy were significantly less likely to report improvement in sexual functioning, were signifi- cantly more likely to report overall worsening of their sex life postoperatively, and reported significantly lower coital frequency [32]. In a smaller retrospective study of 100 women aged 47-55 that controlled for postoperative estrogen therapy, women who had undergone bilateral oophorectomy experienced lower libido, less lubrication, and less pleasure for coitus, than did those who retained their ovaries [33]. Other studies have not found negative effects of hysterectomy and bilateral oophorectomy on sexual functioning [34], possibly reflecting the older mean age of the sample and differences in the measures and recall period.

Conclusions

Surgically menopausal women are at risk for HSDD. Low sexual desire is associated with low levels of sexual arousal, pleasure, and orgasm. Women with HSDD report less frequent sexual activity, lower sexual satisfaction, and lower satisfaction with their partner relationships. Thus, restoring women's sexual desire may assist in improving the quality and stability of relationships and therefore improve women's (and their partners') quality of life. Further research is needed to understand better the relationship between hormonal status and female sexual function after natural or surgical menopause.

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Table 1 Demographic characteristics of the study population

| | Age range | | | |
| | 20–49 years | | 50–70 years | |
	Premenopausal N = 610	Surgically menopausal N = 152	Naturally menopausal N = 319	Surgically menopausal N = 275
Age (years)—mean (SD)	35 (7.5)	44 (4.9)	58 (6.3)	59 (5.9)
Marital status—n (%)				
Married	463 (76)	132 (87)	301 (95)	244 (90)
Single	103 (17)	8(5)	1 (<1)	6 (2)
Divorced	37 (6)	9 (6)	10 (3)	14 (5)
Widowed	3 (1)	3 (2)	5 (2)	8 (3)
HT use in the past 3 months—n (%)	8 (1)	78 (51)	55 (17)	99 (36)
OC use in the past 3 months—n (%)	186 (37)	3 (2)	3 (2)	0
Time with current sexual partner (years)—mean (SD)	12.7 (8.05)	19.8 (9.21)	32.3 (10.9)	32.3 (12.3)
Time since both ovaries removed (years)—mean (SD)	—	10 (12.9)	—	17 (17.8)

Proportions are based on the number of patients for whom data are available.
HT = hormone therapy (i.e., estrogen with or without progestin); OC = oral contraceptives.

Table 2 Percentage with low sexual desire and HSDD

| | Age range | | | | | |
| | 20–49 years | | 50–70 years | | | |
	Premenopausal n/N (%)	Surgically menopausal n/N (%)	Naturally menopausal n/N (%)	Surgically menopausal n/N (%)	OR (95% CI)*	P value*
Low sexual desire	96/597 (16)	43/146 (29)	122/288 (42)	114/248 (46)	1.4 (1.1, 1.9)	0.019
HSDD	40/597 (7)	23/146 (16)	26/288 (9)	30/248 (12)	2.1 (1.4, 3.4)	0.001

*Odds ratio (OR) and P value of relationship between surgically menopausal women and nonsurgical (premenopausal or naturally menopausal) women adjusted for age.

Table 3 Relationship between sexual desire and arousal, orgasm, or pleasure*

| | Age range | | | |
| | 20–49 years | | 50–70 years | |
	Premenopausal	Surgically menopausal	Naturally menopausal	Surgically menopausal
Sexual desire vs. arousal				
N	597	146	284	248
r_p	0.61	0.70	0.62	0.63
P value	<0.001	<0.001	<0.001	<0.001
Sexual desire vs. orgasm				
N	589	141	271	234
r_p	0.46	0.61	0.57	0.57
P value	<0.001	<0.001	<0.001	<0.001
Sexual desire vs. sexual pleasure				
N	572	137	260	225
r_p	0.67	0.78	0.81	0.81
P value	<0.001	<0.001	<0.001	<0.001

*PFSF desire, arousal, orgasm, and pleasure domain scores.

Dennerstein L. Koochaki P.E. Barton I. Graziottin A.
Hypoactive sexual desire disorder in menopausal women: a survey of western european women
The Journal of Sexual Medicine 2006; 3: 212-222

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Table 4 Relationship between sexual desire and frequency of sexual activity*

	Age range							
	20–49 years				50–70 years			
	Premenopausal		Surgically menopausal		Naturally menopausal		Surgically menopausal	
	Low desire	Normal desire	Low desire	Normal desire	Low desire	Normal desire	Low desire	Normal desire
Self-initiated sex								
N	88	447	42	89	105	137	101	116
Mean (SD)	1.3 (2.03)	5.3 (5.02) $P < 0.001$	1.0 (4.05)	5.6 (5.34) $P < 0.001$	0.7 (1.88)	4.2 (4.98) $P < 0.001$	0.7 (1.71)	3.0 (3.28) $P < 0.001$
Median	0	4 $P < 0.001$	0	3 $P < 0.001$	0	3 $P < 0.001$	0	2 $P < 0.001$
Partner-initiated sex								
N	93	449	42	90	107	139	105	117
Mean (SD)	5.9 (5.88)	8.0 (5.79) $P = 0.002$	6.2 (6.63)	8.3 (5.96) $P = 0.058$	3.2 (4.93)	6.6 (5.88) $P < 0.001$	3.2 (4.69)	5.8 (4.92) $P < 0.001$
Median	4	6 $P < 0.001$	4	6.5 $P = 0.007$	2	5 $P < 0.001$	2	5 $P < 0.001$
Intercourse								
N	92	453	40	89	108	150	107	126
Mean (SD)	6.2 (5.99)	13.8 (8.21) $P < 0.001$	4.6 (5.44)	13.6 (9.38) $P < 0.001$	3.1 (4.64)	9.4 (6.80) $P < 0.001$	3.3 (4.22)	9.1 (7.25) $P < 0.001$
Median	4	12 $P < 0.001$	3	10 $P < 0.001$	1	8 $P < 0.001$	2	7 $P < 0.001$
Orgasm								
N	86	449	39	89	102	140	103	123
Mean (SD)	4.6 (5.15)	12.1 (8.43) $P < 0.001$	3.0 (3.96)	11.4 (8.23) $P < 0.001$	2.1 (4.04)	7.9 (6.09) $P < 0.001$	1.3 (1.99)	8.1 (7.05) $P < 0.001$
Median	3	10 $P < 0.001$	2	10 $P < 0.001$	0	7 $P < 0.001$	0	6 $P < 0.001$

*Women classified as low or normal sexual desire based on cutoff score on PFSF desire domain.
Average sexual activity statistically compared between women with low desire and women with normal desire within each reproductive subgroup, using both the parametric two-sampled *t*-test and the Wilcoxon rank-sum test.

Table 5 Relationship between HSDD status and sexual or marital/relationship satisfaction

	HSDD (N = 119) n (%)	Normal desire (N = 900) n (%)
Satisfaction with sex life		
Dissatisfied	50 (42*)	39 (4)
Neither satisfied nor dissatisfied	42 (35*)	55 (6)
Satisfied	27 (23*)	806 (90)
Satisfaction with marriage/relationship		
Dissatisfied	20 (17*)	27 (3)
Neither satisfied nor dissatisfied	21 (18*)	32 (4)
Satisfied	77 (65*)	833 (93)

*$P < 0.001$.
Proportions are based on the number of women for whom data were available.

Table 6 Percentage of women responding that they experienced the following emotional or psychological states often, very often, or always (classified as distressed)

I was or I felt (fill in with words below) about or because of my lack of interest in sex	HSDD* (N = 119) n (%)	Normal (N = 891) n (%)
Concerned	95 (80)	51 (6)
I was letting my partner down	107 (90)	65 (7)
Unhappy	102 (86)	52 (6)
Less feminine	66 (55)	35 (4)
Angry	62 (52)	36 (4)
Disappointed	86 (72)	41 (5)
Hopeless	73 (61)	23 (3)
Upset	72 (61)	35 (4)
Inadequate	83 (71)	30 (3)
Frustrated	81 (68)	35 (4)
Insecure	67 (56)	26 (3)
Sad	86 (72)	38 (4)
Low self-esteem	54 (46)	30 (3)
Troubled	74 (62)	39 (4)
Ashamed	45 (39)	27 (3)
Like a sexual failure	57 (48)	23 (3)
Bitter	51 (43)	24 (3)

*Defined on the basis of low sexual desire (PFSF desire domain score <40) and associated distress (PDS score >60).
Each statement was answered using a six-point categorical scale, corresponding to never, seldom, sometimes, often, very often, or always.
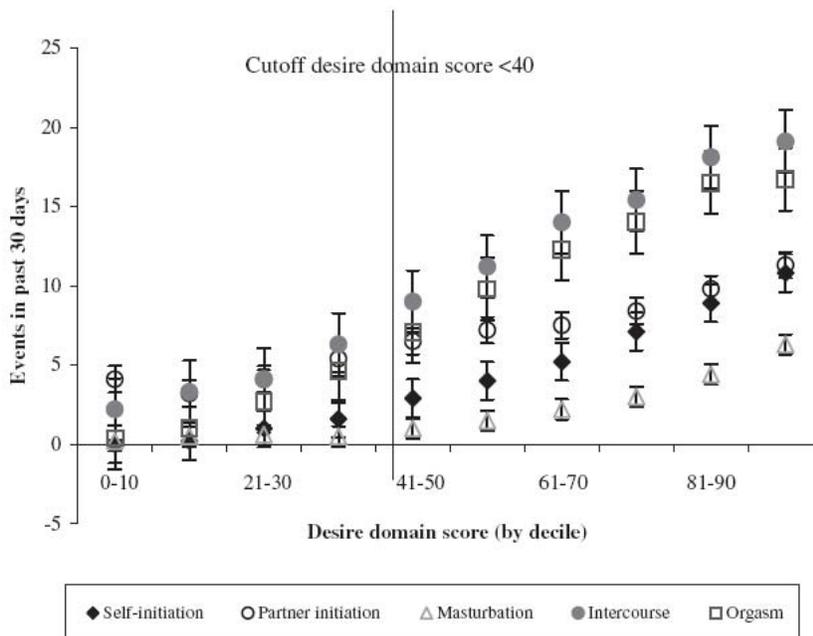

Figure 1 Relationship between sexual desire and sexual activity.