Distressing Sexual Problems in United States Women Revisited: Prevalence After Accounting for Depression

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Objective: With data from the population-based Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking (PRESIDE) study, which has previously estimated the prevalence of sexual problems and sexually related personal distress in United States women, the prevalence of sexual disorders of desire, arousal, and orgasm was re-estimated, taking concurrent depression into consideration.

Method: Current depression was defined in 3 ways as (1) self-reported symptoms alone, (2) antidepressant medication use alone, or (3) symptoms and/or antidepressant use. The unadjusted population prevalence for each distressing sexual problem in the 31,581 respondents was calculated first irrespective of concurrent depression and then in women without concurrent depression, thus determining the size of the population with both conditions present.

Results: The unadjusted population-based prevalence of desire disorder was 10.0% and was reduced to 6.3% for those without concurrent depression, leading to an estimate of 3.7% for those with both conditions present. The same pattern was observed for arousal and orgasm disorders, although overall prevalence estimates were lower.

Conclusions: Our findings indicate that about 40% of those with a sexual disorder of desire, arousal, or orgasm have concurrent depression, As this study was cross-sectional, causality versus comorbidity cannot be determined. However, our findings stress the importance of evaluating depression along with sexual problems in routine clinical practice and epidemiology research.

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Published estimates of the population prevalence of female sexual problems vary widely and depend on the way in which sexual problems are defined. To establish the diagnosis of a sexual disorder, the *Diagnostic and Statistical Manual for Mental Disorders,* Fourth Edition (*DSM-IV*), requires 3 criteria, specifically that (1) a sexual deficiency (desire, arousal, or orgasm) is present, (2) the deficiency causes marked distress or interpersonal difficulty, and (3) the condition is not better accounted for by another Axis I disorder, such as depression, or is not due exclusively to the effects of a substance (including medications) or a medical condition.[1] Prevalence estimates from national population samples based on sexual deficiencies or problems are much higher than estimates that also incorporate the criterion of concomitant sexually related personal distress. The population prevalence of female sexual problems is reported as 43%–44% in the United States,[2–4] 54% in the United Kingdom,[5] and 61%–71% in Australia.[6,7] In 2 of the US studies, sexually related personal distress was reported in about 22% of the sample,[3,4] and one study estimated the combined prevalence of self-reported sexual problems with distress as 12%.[4]

The prevalence of low sexual desire with accompanying personal distress by 10-year age groups in women aged 30–69 years as estimated in the Women's International Study of Health and Sexuality (WISHeS) was 6% in women aged 30–39 years, 10% in women aged 40–49 years, 13% in women aged 50–59 years, and 12% in women aged 60–69 years in European women,[8] and 19% in women aged 30–39 years, 15% in women aged 40–49 years, 13% in women aged 50–59 years, and 12% in women aged 60–69 years in US women.[9] Similar age-stratified estimates from a national probability sample of US women were 8% in women aged 30–39 years, 9% in women aged 40–49 years, 9% in women aged 50–59 years, and 6% in women aged 60–70 years[10] and were 10% in women aged 30–39 years, 11% in women aged 40–49 years, 13% in women aged 50–59 years, and 10% in women aged 60–69 years in the US Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking (PRESIDE) study.[4] While these estimates that included the second diagnostic criterion of

the *DSM-IV* (personal distress) are much lower than the overall prevalence of self-reported low desire (36%–38%), they do not take into consideration another Axis I disorder, such as depression. They thus may still overestimate the prevalence of sexual desire problems in women, assuming that depression could be the primary cause of the sexual problem in some cases (ie, causality) versus concurrently present in others (ie, comorbidity).

The association of sexual dysfunctions, especially low desire or reduced libido, both with depression[11–13] and as a consequence of antidepressant therapy,[14–20] is well documented. In a large French study of patients consulting general practitioners and community psychiatrists for major depression that excluded patients with sexual dysfunction occurring before the onset of the depressive episode, 36% spontaneously reported sexual problems, and 69% reported sexual problems when questioned by their physician.[11] Low libido was the type of sexual problem most commonly reported by female patients.[11] The co-occurrence of low sexual desire and depression in women not on antidepressant therapy has also been documented in clinic-based settings.[13] In a prospective Spanish study, 60% of women developed sexual dysfunction, in particular decreased libido and orgasm problems, after the onset of antidepressant therapy,[14] and in a US study of adult primary care outpatients that included over 4,500 women, the overall prevalence of sexual dysfunction was 37% in patients on monotherapy with an antidepressant approved for use in the United States since 1988, and it ranged from 22% to 43%, depending on the type of medication or mechanism of action of the drug.[17] Population-based studies have demonstrated that the prevalence of low desire with associated personal distress in women with self-reported current depression is more than double that in women without depression.[4,10] In addition, current depression with or without antidepressant use is a strong and independent correlate of sexual distress in women with low sexual desire.[21]

With available data from the PRESIDE study, a large, population-based study that has previously estimated the prevalence and described correlates of sexual problems and sexually related personal distress, in addition to treatment-seeking behavior of women with distressing sexual problems,[4,21,22] we sought to re-estimate the prevalence of distressing sexual problems of low desire, arousal, and orgasm, while accounting for concurrent depression, and to describe the characteristics of these groups. Depression, a known Axis I disorder, is a component of the third *DSM-IV* diagnostic criterion for sexual disorders in the sense that the sexual disorder should not be better accounted for by the presence of such an Axis I disorder. The current analysis provides an opportunity to examine the extent of concomitant depression and/or use of antidepressant medication and their effect on the prevalence of sexual disorders and consequently to define the prevalence of women with both a distressing sexual problem and depression.

METHOD

Participants

The PRESIDE study is a cross-sectional, population-based household survey of female adults in the United States, the methods of which have been previously described.[4] Participants were sampled from the Taylor Nelson Sofres 6th Dimension Global Access Panel. The initial sample of 50,002 households was balanced against demographic characteristics of the US census, including age, race, marital status, education, and income. Institutional review board approval was granted with a waiver of written informed consent documentation under 45 CFR §46 110(b), category 7. Data were collected from eligible participants, female heads of the household aged 18 years and older, using mailed questionnaires during August and September 2006. A total of 31,581 women completed the survey for a response rate of 63%, comparable to other community-based surveys of female sexual problems.[23]

Instruments

The female version of the Changes in Sexual Functioning Questionnaire short-form (CSFQ-14) was used to measure current sexual behavior in all respondents, without limiting participation to those with a current partner or recent sexual activity.[24] Sexual problems of desire, arousal, and orgasm were defined using the 2 clinically relevant response categories of never = 1 or rarely = 2 from a 5-point scale for relevant questions, as listed in the footnotes to Table 1. Low desire was defined in the current analysis according to a single question that has direct face validity in a clinical setting: "How often do you desire to engage in sexual activity?"

Sexually related personal distress was measured using the 12-item Female Sexual Distress Scale (FSDS), which measures a woman's feelings concerning distress about her sex life, assessing guilt, frustration, stress, worry, anger, embarrassment, and unhappiness using a 30-day recall period.[25] Responses for each item on a 5-point scale (0 = never to 4 = always) are summed for an overall score ranging from 0 to 48, with a value of 15 or higher indicating sexual distress.[25] A sexual problem of desire, arousal, or orgasm was considered distressing if associated concurrently with personal distress (FSDS score ≥ 15).

Quality of life was measured using the 12-Item Short-Form Health Survey (SF-12 version 1).[26] The domain score for social functioning, as well as 2 summary scores, the Physical Component Score (PCS) and Mental Component Score (MCS), were normalized to have mean values of 50 and SDs of 10. Scores above 50 represent functioning above the average in a US population-based sample.[26,27]

Variables

Definitions of depression. We assessed concurrent depression in several ways to provide a range of prevalence estimates. Definitions were based on self-reported

Table 1. Prevalence of Distressing Sexual Problems in the Overall PRESIDE Population Calculated in 2 Ways: (1) Irrespective of Concurrent Depression and (2) Without Concurrent Depression[a]

Definitions of Depression Used to Identify Respondents With Current Depression	No. of Valid Responses	Unadjusted Prevalence Irrespective of Concurrent Depression, %	Unadjusted Prevalence Without Concurrent Depression, % (95% CI)	Age-Adjusted Prevalence to US Female Population Without Concurrent Depression, %
Self-reported distressing low desire[b]				
1. Self-reported depressive symptoms[c] without antidepressant use	28,424	10.0	8.8 (8.5–9.2)	8.4
2. Antidepressant use[d] without self-reported depressive symptoms	28,762	10.0	7.5 (7.2–7.8)	7.2
3. Self-reported depressive symptoms and/or antidepressant use	28,424	10.0	6.3 (6.0–6.6)	6.0
Self-reported distressing low arousal[e]				
1. Self-reported depressive symptoms[c] without antidepressant use	28,437	5.4	4.7 (4.5–5.0)	4.5
2. Antidepressant use[d] without self-reported depressive symptoms	28,775	5.4	3.9 (3.7–4.2)	3.8
3. Self-reported depressive symptoms and/or antidepressant use	28,437	5.4	3.3 (3.1–3.5)	3.1
Self-reported distressing problem with orgasm[f]				
1. Self-reported depressive symptoms[c] without antidepressant use	27,826	4.7	4.1 (3.8–4.3)	4.0
2. Antidepressant use[d] without self-reported depressive symptoms	28,154	4.7	3.4 (3.2–3.6)	3.4
3. Self-reported depressive symptoms and/or antidepressant use	27,826	4.7	2.8 (2.6–3.0)	2.8
Any self-reported distressing sexual problem[g]				
1. Self-reported depressive symptoms[c] without antidepressant use	28,379	12.1	10.7 (10.3–11.0)	10.2
2. Antidepressant use[d] without self-reported depressive symptoms	28,715	12.0	9.0 (8.7–9.4)	8.7
3. Self-reported depressive symptoms and/or antidepressant use	28,379	12.1	7.6 (7.3–7.9)	7.3

[a]Self-reported current depression was assessed using 3 different definitions: (1) symptoms of current depression defined by the screening questions (see footnote c) and not taking antidepressant medication, (2) antidepressant medication use (see footnote d) without self-reported symptoms, and (3) self-reported symptoms of depression and/or antidepressant medication use.
[b]Response of "never" or "rarely" to question, "How often do you desire to engage in sexual activity?" and a score of 15 or higher on the Female Sexual Distress Scale.
[c]Response of "yes" to both of these questions: (1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" and (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?"
[d]Antidepressant use assessed by a response of "yes" to the statement, "I am currently taking medication to treat depression."
[e]Response of "never" or "rarely" to 3 questions: "How often do you become sexually aroused?" "Are you easily aroused?" and "Do you have adequate vaginal lubrication during sexual activity?" and a score of 15 or higher on the Female Sexual Distress Scale.
[f]Response of "never" or "rarely" to 2 questions: "How often do you experience an orgasm?" and "Are you able to have an orgasm when you want to?" and response of "no enjoyment or pleasure" or "little enjoyment or pleasure" to the question, "How much pleasure do you get from your orgasms?" and a score of 15 or higher on the Female Sexual Distress Scale.
[g]Distressing sexual problem of desire, arousal, or orgasm.
Abbreviation: PRESIDE = Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking.

symptoms, antidepressant use, or a combination of the 2. Self-reported symptoms were assessed either by a score of 40 or lower on the SF-12 MCS scale (1 SD lower than the US population norm) or a positive response to both of the following questions: (1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?" We examined 8 different definitions based on symptoms defined in each of the 2 ways described above without antidepressant use, antidepressant use without symptoms, symptoms or antidepressant use, and symptoms and/or antidepressant use. Three definitions were selected for further analyses. Definitions with current depressive symptoms assessed by the 2 screening questions were chosen rather than the SF-12 MCS score, because of fewer missing responses. The 3 definitions used in analyses were, therefore, (1) symptoms of current depression defined by the screening questions and not taking antidepressant medication, (2) antidepressant medication use (response of "yes" to "I am currently taking medication to treat depression") without self-reported symptoms, and (3) self-reported symptoms of depression and/or antidepressant medication use.

Other variables. Covariates included demographic factors (age, race, marital and partner status, educational level, and employment status), reproductive history (parity, current use of hormonal contraceptives or hormone therapy, and menopausal status), and health-related factors (self-assessed health, history of selected chronic medical conditions, use of selected medications, and smoking status). Reproductive status was defined as premenopausal if the respondent was 55 years old or younger and menstrual bleeding had occurred less than 12 months ago (or if not, currently pregnant or breast feeding), surgically postmenopausal if the respondent indicated oophorectomy with or without hysterectomy, and naturally postmenopausal if the last menstrual bleeding occurred more than 12 months ago and the criteria for premenopausal or surgically postmenopausal were not met.

Analyses

Statistical analyses were preformed using SAS version 9.1 (SAS Institute Inc, Cary, North Carolina). The unadjusted

Table 2. Prevalence of Desire Disorder in PRESIDE Respondents Without Depression (using 3 definitions of self-reported current depression) by Demographic Characteristics and Menopausal Status

Characteristic	Self-Reported Depressive Symptoms Without Antidepressant Use[a]			Antidepressant Use Without Self-Reported Depressive Symptoms			Self-Reported Depressive Symptoms and/or Antidepressant Use[a]		
	N[b]	Unadjusted Prevalence % (95% CI)	Adjusted Prevalence Ratio[c] (95% CI)	N[b]	Unadjusted Prevalence % (95% CI)	Adjusted Prevalence Ratio[c] (95% CI)	N[b]	Unadjusted Prevalence % (95% CI)	Adjusted Prevalence Ratio[c] (95% CI)
Age, y									
18–24	2,176	3.4 (2.7–4.3)	1.00 (Reference)	2,192	3.3 (2.6–4.1)	1.00 (Reference)	2,176	2.6 (1.9–3.3)	1.00 (Reference)
25–34	4,414	7.7 (6.9–8.5)	2.2 (1.7–2.8)	4,448	7.2 (6.4–8.0)	2.3 (1.8–3.0)	4,414	5.8 (5.1–6.5)	2.3 (1.8–3.1)
35–44	5,861	9.2 (8.5–10.0)	2.6 (2.1–3.3)	5,906	7.7 (7.0–8.4)	2.5 (1.9–3.2)	5,861	6.4 (5.8–7.1)	2.6 (2.0–3.5)
45–54	6,477	10.9 (10.1–11.7)	3.0 (2.4–3.9)	6,535	8.8 (8.1–9.5)	2.8 (2.2–3.6)	6,477	7.3 (6.6–7.9)	3.0 (2.3–3.9)
55–64	4,595	11.3 (10.4–12.2)	2.9 (2.2–3.9)	4,654	8.6 (7.8–9.5)	2.7 (2.0–3.7)	4,595	7.7 (6.9–8.5)	3.0 (2.2–4.3)
65–74	2,642	7.3 (6.4–8.4)	1.7 (1.2–2.3)	2,694	7.2 (6.3–8.2)	1.9 (1.3–2.6)	2,642	6.2 (5.4–7.2)	2.1 (1.4–3.0)
75+	1,948	5.8 (4.8–6.9)	1.3 (1.0–1.9)	2,018	5.6 (4.6–6.7)	1.4 (1.0–2.0)	1,948	5.1 (4.2–6.2)	1.6 (1.1–2.4)
Race									
White	22,965	9.5 (9.1–9.8)	1.00 (Reference)	23,197	7.9 (7.5–8.2)	1.00 (Reference)	22,965	6.7 (6.3–7.0)	1.00 (Reference)
African American	3,440	5.7 (4.9–6.5)	0.6 (0.5–0.7)	3,512	5.1 (4.4–5.9)	0.6 (0.5–0.7)	3,440	4.4 (3.7–5.1)	0.6 (0.5–0.7)
Asian/Pacific Islander	1,036	6.9 (5.5–8.7)	0.8 (0.6–1.0)	1,047	7.2 (5.7–8.9)	0.9 (0.7–1.1)	1,036	5.8 (4.4–7.4)	0.8 (0.6–1.1)
All Other	899	7.1 (5.5–9.0)	0.8 (0.7–1.1)	921	6.7 (5.2–8.5)	0.9 (0.7–1.2)	899	5.3 (4.0–7.0)	0.9 (0.7–1.2)
Education Level									
Higher education	17,146	8.2 (7.8–8.6)	1.00 (Reference)	17,321	6.9 (6.5–7.3)	1.00 (Reference)	17,146	6.1 (5.7–6.4)	1.00 (Reference)
Completed high school	8,628	9.5 (8.9–10.1)	1.2 (1.1–1.3)	8,736	8.2 (7.7–8.8)	1.2 (1.1–1.3)	8,628	6.7 (6.2–7.3)	1.1 (1.0–1.3)
Did not complete high school	2,539	10.8 (9.6–12.1)	1.5 (1.3–1.7)	2,589	9.0 (7.9–10.1)	1.4 (1.2–1.6)	2,539	6.6 (5.7–7.7)	1.3 (1.1–1.5)
Menopausal status									
Premenopausal, ages ≤ 55 y	18,347	8.6 (8.2–9.0)	1.00 (Reference)	18,506	7.3 (7.0–7.7)	1.00 (Reference)	18,347	6.1 (5.7 - 6.4)	1.00 (Reference)
Surgically postmenopausal	2,998	11.1 (10.0–12.3)	1.3 (1.1–1.5)	3,007	8.6 (7.6–9.7)	1.2 (1.0–1.5)	2,998	7.4 (6.5 - 8.4)	1.2 (1.0–1.5)
Naturally postmenopausal	6,893	8.5 (7.9–9.2)	1.1 (0.9–1.3)	7,060	7.4 (6.8–8.0)	1.0 (0.8–1.3)	6,893	6.5 (5.9 - 7.1)	1.0 (0.8–1.3)
Current cigarette smoker									
No	22,925	8.6 (8.3–9.0)	1.00 (Reference)	22,967	7.3 (6.9–7.6)	1.00 (Reference)	22,925	6.4 (6.1 - 6.7)	1.00 (Reference)
Yes	5,049	9.9 (9.1–10.7)	1.1 (1.0–1.2)	5,063	8.3 (7.5–9.0)	1.1 (1.0–1.3)	5,049	6.0 (5.4 - 6.7)	1.0 (0.9–1.2)

[a]Self-reported depressive symptoms were defined in this analysis based on a response of "yes" to both of these questions:
(1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" and (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?

[b]The N for each variable is the number of women with nonmissing responses. Item nonresponse varies by question.

[c]The adjusted prevalence ratio for each variable is based on the log-binomial model with covariates of age, menopausal status, race, education level, and current smoking status.

Abbreviation: PRESIDE = Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking.

point prevalence for each distressing sexual problem in the overall respondent sample was calculated first irrespective of current depression status and then in women without current depression as defined by each of the definitions of depression. For each category of depression, the denominator of the prevalence estimate was the number of women with nonmissing responses to the CSFQ-14, the FSDS, and the questions used to define depression. The 95% CIs for the prevalence estimates in women without depression were also calculated, as was the prevalence adjusted to the age of the US female population using 2005 US Census data.

For each of the 3 selected definitions of current depression, the unadjusted prevalence for each of the sexual disorders was prepared for each category of the following variables: age, race, educational level, menopausal status, and smoking status. Adjusted prevalence ratios were calculated using the log-binomial model adjusted for these variables. The results for desire disorder will be presented in more detail, as it was the most prevalent disorder, and in order to compare the results with previously published findings that did not consider concurrent depression.[21]

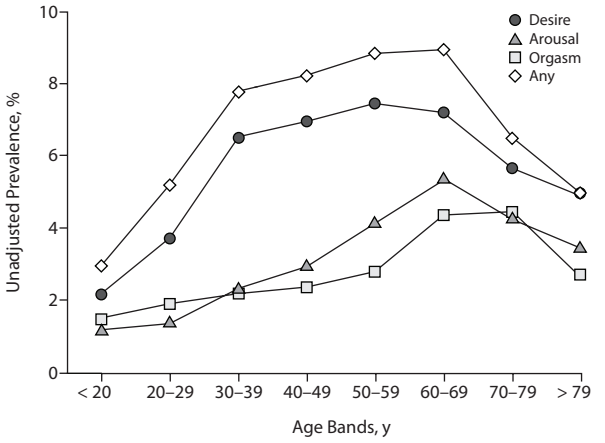
Independent correlates of sexual distress in women with low desire and without depression, as defined by current symptoms and/or antidepressant therapy, were identified using multivariable logistic regression with backward selection, with presence (FSDS ≥ 15) or absence (FSDS < 15) of distress as the dependent variable. The same methodology was used as was reported in a previous analysis of PRESIDE data in women with low desire without excluding depressed women,[21] so that the results could be compared. The set of initial covariates included age, race, partner status, educational level, employment, smoking and menopausal status, use of hormonal contraceptives or hormone therapy, individual chronic medical conditions, use of antihypertensive or cholesterol-lowering medications, SF-12 social functioning score, and self-assessed health. A final model was constructed using covariates retained after the backward selection, forcing in one additional covariate to represent the presence of other sexual problems of arousal or orgasm. Results of the current and previous analyses[21] were compared to determine whether the correlates of sexual distress in women with low desire differed depending on the presence or absence of concurrent depression.

RESULTS

The prevalence of each of the sexual disorders without concurrent depression was lower than the prevalence calculated irrespective of concurrent depression, and prevalence estimates varied by the way in which current depression was defined, ie, as symptoms alone, treatment alone, or treatment and symptoms combined (Table 1). Prevalence estimates calculated in the absence of concurrent depression (using both treatment and/or symptoms) were about 60% of the value of estimates calculated irrespective of the presence of concurrent depression for all the distressing sexual problems (Table 1). The age-unadjusted prevalence for desire disorder was 6.3% without concurrent depression compared with 10% irrespective of depression. Accordingly, the prevalence of arousal disorder without and with concurrent depression was 3.3% and 5.4%, respectively, and for orgasm disorder was 2.8% and 4.7%, respectively. The age-unadjusted population prevalence of any distressing sexual problem, without accounting for concurrent depression, was 12.1% and was reduced to 7.6% in the absence of concurrent depression. Most prevalence estimates were slightly lower after adjusting for the age of the US female population (Table 1).

Similar patterns for the prevalence of desire disorder without depression according to demographic characteristics and menopausal status were seen for each of the 3 definitions of depression used (Table 2). The prevalence increased with each age group through age 64 years and declined for women ages 65 and older, with the highest prevalence noted in women ages 45–64 years. Prevalence was highest for white women, for women with lower educational level, and for women with surgical menopausal status. The age-stratified prevalence of arousal and orgasm disorders differed from that of desire disorder in that the peak prevalence was found in older women (ages 55–74 years); the pattern for menopausal status was similar to women with desire disorder regarding surgical menopause, but naturally postmenopausal women had higher prevalences than premenopausal women for arousal (4.5% vs 2.5%, respectively) and orgasm disorders (3.5% vs 2.3%, respectively)

Figure 1. Prevalence of Sexual Disorders in the Absence of Concurrent Depression by 10-Year Age Bands[a]



[a]Current depression was defined as self-reported depressive symptoms (response of "yes" to both of these questions: (1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" and (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?") and/or antidepressant use (a response of "yes" to the statement, "I am currently taking medication to treat depression.").

Table 3. Characteristics of PRESIDE Participants With Sexual Disorders of Desire, Arousal, or Orgasm Without Concurrent Depression (ie, depressive symptoms[a] and/or antidepressant therapy)

Characteristic	Type of Sexual Disorder			
	Any (n = 2,165) n[b] (%)	Desire (n = 1,791) n[b] (%)	Arousal (n = 927) n[b] (%)	Orgasm (n = 767) n[b] (%)
Age, y				
Mean (SD)	48.8 (14.56)	49.3 (14.51)	53.2 (14.74)	51.7 (15.98)
18–24	81 (3.8)	56 (3.2)	21 (2.3)	37 (4.9)
25–34	322 (15.0)	255 (14.4)	97 (10.6)	94 (12.4)
35–44	447 (20.8)	375 (21.1)	136 (14.8)	129 (17.0)
45–54	561 (26.2)	470 (26.5)	225 (24.6)	167 (21.9)
55–64	420 (19.6)	353 (19.9)	235 (25.7)	155 (20.4)
65–74	208 (9.7)	165 (9.3)	133 (14.5)	124 (16.3)
≥ 75	105 (4.9)	100 (5.6)	69 (7.5)	55 (7.2)
Race				
African American	192 (8.9)	150 (8.4)	82 (8.9)	91 (11.9)
White	1,834 (84.9)	1,529 (85.6)	785 (84.9)	631 (82.4)
Asian/Pacific Islander	77 (3.6)	60 (3.4)	28 (3.0)	25 (3.3)
Native American/other/prefer not to answer	57 (2.6)	48 (2.7)	30 (3.2)	19 (2.5)
Marital status				
Married or living with spouse/partner	1,675 (78.1)	1,408 (79.4)	715 (78.2)	534 (70.5)
Divorced/widowed/separated	281 (13.1)	231 (13.0)	131 (14.3)	134 (17.7)
Single	188 (8.8)	135 (7.6)	68 (7.4)	89 (11.8)
Current partner	1,801 (83.2)	1,495 (83.5)	753 (81.2)	589 (76.8)
Educational level				
Did not complete high school	204 (9.4)	168 (9.4)	117 (12.6)	102 (13.3)
Completed high school	704 (32.6)	581 (32.5)	334 (36.0)	279 (36.4)
Higher education	1,253 (58.0)	1,038 (58.1)	476 (51.3)	385 (50.3)
Work part or full-time	1,268 (60.0)	1,047 (60.1)	492 (54.4)	396 (52.9)
Parity				
None	420 (19.4)	338 (18.9)	175 (18.9)	160 (20.9)
1	377 (17.4)	299 (16.7)	170 (18.4)	128 (16.7)
2	678 (31.4)	586 (32.8)	268 (29.0)	213 (27.8)
3	411 (19.0)	342 (19.1)	166 (17.9)	133 (17.4)
≥ 4	276 (12.8)	223 (12.5)	146 (15.8)	132 (17.2)
Menopausal status				
Premenopausal, aged ≤ 55 y	1,357 (63.1)	1,110 (62.4)	456 (49.5)	413 (54.1)
Surgically postmenopausal	275 (12.8)	222 (12.5)	156 (16.9)	122 (16.0)
Naturally postmenopausal	518 (24.1)	446 (25.1)	309 (33.6)	229 (30.0)
Currently taking hormonal contraceptives or hormone replacement therapy	400 (18.5)	321 (17.9)	142 (15.3)	130 (16.9)
Self-assessed health (from SF-12)				
Poor	44 (2.0)	37 (2.1)	29 (3.1)	19 (2.5)
Fair	270 (12.5)	226 (12.6)	133 (14.3)	123 (16.1)
Good	741 (34.3)	618 (34.6)	335 (36.1)	272 (35.6)
Very good	856 (39.6)	703 (39.3)	340 (36.7)	269 (35.2)
Excellent	250 (11.6)	203 (11.4)	90 (9.7)	82 (10.7)
Chronic medical conditions				
Hypertension	606 (28.0)	509 (28.4)	296 (31.9)	246 (32.1)
Arthritis	603 (27.9)	492 (27.5)	323 (34.8)	265 (34.6)
Anxiety	295 (13.6)	241 (13.5)	123 (13.3)	102 (13.3)
Thyroid problems	299 (13.8)	250 (14.0)	156 (16.8)	118 (15.4)
Asthma	247 (11.4)	203 (11.3)	107 (11.5)	84 (11.0)
Diabetes	198 (9.1)	163 (9.1)	101 (10.9)	92 (12.0)
Coronary heart disease or other heart conditions	201 (9.3)	170 (9.5)	115 (12.4)	92 (12.0)
Chronic pain	190 (8.8)	162 (9.0)	100 (10.8)	62 (8.1)
Inflammatory bowel disease or irritable bowel syndrome	199 (9.2)	168 (9.4)	97 (10.5)	66 (8.6)
Urinary incontinence	156 (7.2)	129 (7.2)	87 (9.4)	75 (9.8)
Cancer	162 (7.5)	134 (7.5)	79 (8.5)	62 (8.1)
Ulcer	137 (6.3)	109 (6.1)	68 (7.3)	61 (8.0)
Four or more chronic medical conditions	376 (17.4)	312 (17.4)	198 (21.4)	168 (21.9)
Antihypertensive/cholesterol-lowering therapy	643 (29.7)	545 (30.4)	327 (35.3)	259 (33.8)
Current cigarette smoker	366 (17.1)	305 (17.3)	155 (17.1)	103 (13.7)
Satisfaction with sex life				
Extremely satisfied	35 (1.6)	32 (1.8)	22 (2.4)	18 (2.4)
Somewhat satisfied	257 (12.0)	197 (11.1)	69 (7.5)	80 (10.5)
Neither satisfied nor dissatisfied	543 (25.3)	461 (25.9)	230 (25.1)	194 (25.6)
Somewhat dissatisfied	650 (30.2)	542 (30.4)	243 (26.5)	174 (22.9)
Extremely dissatisfied	664 (30.9)	548 (30.8)	354 (38.6)	293 (38.6)

(continued)

Table 3 (continued). Characteristics of PRESIDE Participants With Sexual Disorders of Desire, Arousal, or Orgasm Without Concurrent Depression (ie, depressive symptoms[a] and/or antidepressant therapy)

Characteristic	Type of Sexual Disorder			
	Any (n = 2,165) n[b] (%)	Desire (n = 1,791) n[b] (%)	Arousal (n = 927) n[b] (%)	Orgasm (n = 767) n[b] (%)
Female Sexual Distress Scale score				
15–20	808 (37.3)	669 (37.4)	319 (34.4)	261 (34.0)
21–30	898 (41.5)	737 (41.2)	352 (38.0)	312 (40.7)
31–40	349 (16.1)	289 (16.1)	169 (18.2)	123 (16.0)
41–48	110 (5.1)	96 (5.4)	87 (9.4)	71 (9.3)
Mean (SD)	24.5 (7.92)	24.6 (8.02)	25.8 (9.00)	25.6 (9.01)
SF-12 mental component score (mean, SD)	48.2 (8.82)	48.2 (8.82)	48.6 (8.99)	48.0 (9.12)
SF-12 physical component score (mean, SD)	49.1 (10.44)	48.9 (10.53)	47.6 (10.90)	48.2 (10.87)
SF-12 social functioning score (mean, SD)	48.4 (9.26)	48.3 (9.31)	48.3 (9.53)	48.0 (9.50)
1–40	556 (25.8)	466 (26.1)	249 (26.9)	214 (28.0)
41–50	551 (25.6)	458 (25.7)	217 (23.5)	184 (24.1)
51–60	1,047 (48.6)	859 (48.2)	459 (49.6)	366 (47.9)
Help-seeking behavior				
Formal	635 (31.3)	545 (32.3)	286 (32.8)	182 (25.3)
Informal	897 (44.2)	739 (43.8)	344 (39.4)	317 (44.2)
Anonymous	189 (9.3)	148 (8.8)	72 (8.3)	89 (12.4)
Did not seek	308 (15.2)	254 (15.1)	170 (19.5)	130 (18.1)

[a]Self-reported depressive symptoms were defined in this analysis based on a response of "yes" to both of these questions: (1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" and (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?"
[b]The N for each variable is the number of women with nonmissing responses. Item nonresponse varies by question.
Abbreviations: PRESIDE = Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking, SF-12 = 12-Item Short-Form Health Survey.

(data not shown); for desire disorder the (adjusted) prevalence ratio was 1.0.

Figure 1 compares the pattern of age-specific prevalence for each of the sexual disorders by 10-year age groups without depression, when depression was defined by symptoms and/or antidepressant use.

The characteristics of women with each type of sexual disorder without concurrent depression (as defined by depressive symptoms and/or antidepressant therapy) are shown in Table 3. Women with disorders of arousal or orgasm were somewhat older than women with desire disorder. The distribution of characteristics did not vary appreciably among the 3 types of sexual disorders, except that a higher proportion of women with desire disorder were employed, had higher education, and were premenopausal than women with disorders of arousal or orgasm. In addition, a somewhat higher proportion of women with arousal or orgasm disorders had chronic medical conditions than did women with desire disorder.

In the multivariable regression analysis (Table 4), the strongest independent correlate of sexual distress in women with low desire without concurrent depression was the presence of a current partner (adjusted odds ratio = 4.86, 95% CI, 4.17–5.65). Other factors that were associated with increased odds of distress in women with low desire without depression were white race, SF-12 social functioning scores in the 2 lowest categories, a history of anxiety, or inflammatory bowel disease, use of hormonal therapy (contraceptives or hormone replacement therapy), and unemployment.

DISCUSSION

Sexual disorders can be diagnosed in the presence of depression when the depression is not assessed to be the principal cause of the disorder. The comorbidity versus causality of depression and sexual disorders cannot be established in a cross-sectional survey such as PRESIDE. However, our analyses indicate that about 40% of the population-based estimate consists of women with distressing sexual problems and concurrent depression. We therefore consider the prevalence estimates calculated irrespective of depression as the "upper boundary" and the 40% reduced estimates of those without concurrent depression as the "lower boundary" of the population burden of sexual disorders.

Despite the reduction in overall prevalence, however, the results of the current analysis show similar trends in the prevalence according to demographic characteristics and menopausal status as in a previous analysis of the PRESIDE data.[21] The adjusted prevalence ratios in the 2 analyses were similar, although in the older age groups (> 45 years), the prevalence ratios in the current analyses were higher than in the previous analyses.[21] The prevalence ratios did not vary greatly in the current analysis when depression was defined by symptoms alone, antidepressant use alone, or a combination of the 2. The finding in the current analysis of a higher prevalence of low desire with distress in surgically menopausal women than in premenopausal or naturally postmenopausal women was also consistent with results from other US population-based studies.[9,10]

Table 4. Correlates of Sexually Related Personal Distress in PRESIDE Respondents With Low Sexual Desire and Without Self-Reported Current Depression[a] (N = 7,560)[b]: Results of Final Multivariable Logistic Regression Model

Variable	Adjusted Odds Ratio	95% Confidence Interval
Age, y		
18–24	1.00	Reference
25–34	3.01	2.09–4.34
35–44	2.58	1.82–3.66
45–54	1.97	1.40–2.77
55–64	1.22	0.87–1.71
65–74	0.65	0.45–0.93
≥75	0.44	0.30–0.65
Race		
White	1.00	Reference
Asian/Pacific Islander	0.63	0.46–0.87
African-American	0.83	0.67–1.02
Native American/other/prefer not to answer	0.79	0.54–1.17
Current partner (yes vs no)	4.86	4.17–5.65
Employment status (other vs full- or part-time work)	0.85	0.74–0.98
Use of hormonal contraceptives or hormone replacement therapy	1.29	1.08–1.53
SF-12 Social Functioning score[c]		
51–60	1.00	Reference
41–50	1.87	1.61–2.17
1–40	2.29	1.96–2.67
Inflammatory bowel disease/irritable bowel syndrome	1.31	1.05–1.64
Anxiety	1.74	1.42–2.13
Presence of concurrent sexual problems of arousal, orgasm, or both	1.12	0.99–1.28

[a]Depression was defined in this analysis as self-reported depressive symptoms based on a response of "yes" to both of these questions: (1) "Have you been consistently depressed or down, most of the day, nearly every day, for the past 2 weeks?" and (2) "In the past 2 weeks, have you been much less interested in most things or much less able to enjoy the things you used to enjoy most of the time?" and/or current use of antidepressant therapy.

[b]Number of women with nonmissing data on all variables in the model. Backward regression; full model included additionally the following variables that were not retained in the final model: education, smoking, antihypertensive/lipid-lowering medication, self-assessed health, menopausal status, and all chronic medical conditions as listed in Table 3. Presence of concurrent sexual problems was forced into the final model.

[c]50 = norm for US population and 10 = standard deviation (SD). Values ≥ 1 SD away from norm are considered low (1–40); values in the range of 41–59 are considered normal. The highest score was 60.

Abbreviations: PRESIDE = Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking, SF-12 = 12-Item Short-Form Health Survey.

The distribution of characteristics for each of the sexual disorders without concurrent depression (Table 3) can be compared with those reported in 2 other previous PRESIDE analyses, in Table 1 in Shifren et al[4] and in Table 2 in Rosen et al.[21] For desire disorder, the most notable differences between Shifren et al[4] (without accounting for current depression) and the current analysis were found in the proportion of women with the following variables: anxiety (26.6% vs 13.5%, respectively), chronic pain (16.3% vs 9.0%, respectively), and 4 or more chronic medical conditions (29.9% vs 17.4%, respectively). The most notable difference between Rosen et al[21] (without accounting for current depression) and the current analysis was found in the proportion of women with a social functioning score of 1–40, indicating low functioning, from the SF-12 (42.1% vs 26.1%, respectively). In general, women in the current analysis appeared somewhat healthier overall than in the previous analysis,[4] in that a lower proportion reported poor self-assessed health, smoking, and chronic medical conditions, especially anxiety and chronic pain, conditions that are frequently comorbid with depression.

We were unable to find comparable prevalence estimates in the published literature with which to compare our results. In a study of the lifetime prevalence of psychosexual dysfunction among residents of Iceland aged 55 to 57 years, sexual dysfunctions were assessed in a structured interview using the Diagnostic Interview Schedule, Version IIIA, excluding subjects with a major depressive episode.[28] The lifetime prevalence of female sexual dysfunction was estimated at 22%, and the lifetime prevalence of inhibited sexual desire, inhibited sexual excitement, and inhibited orgasm in women was 16%, 6.2%, and 3.5%, respectively.[28] Our estimates, however, are not directly comparable with these results,[28] because ours were point prevalence estimates based on self-reported sexual problems and depression in a population of respondents with a much wider age range than the Icelandic population studied by Lindal and Stefansson.[28] However, the point prevalence estimates in our analysis for women aged 55–64 years for desire, arousal, and orgasm disorder were 7.7%, 5.1%, and 3.5%, respectively.

The possibility of a common biologic mechanism for depression and desire disorder was suggested by results from a matched comparison study of 46 married subjects with inhibited desire and 36 controls without, all without current or recent depression at the time of the study.[29] Over 50% of subjects with inhibited desire had a history of depression, compared with about 30% of the controls, and in most cases, the onset of inhibited desire followed or coincided with the first depressive episode.[29]

Strengths of the PRESIDE study are the large sample size and the wide age range, allowing for the calculation of precise prevalence estimates. PRESIDE was a cross-sectional study, however, so we cannot determine causality or direction of observed effects. Despite using a research panel instead of a national probability sample, there was little evidence of bias according to demographic factors or nonresponse demonstrated in previous analyses.[4] Because of the large, population-based sample, it was not feasible to conduct structured clinical interviews for the assessment of sexual problems, sexual distress, or depression. We did, however, use instruments with demonstrated psychometric properties for the assessment of sexual problems and distress, and we conducted extensive sensitivity analyses using 8 different depression definitions (the results of 3 definitions were shown in detail) to examine the effects of depression on the prevalence of distressing sexual problems. The definitions chosen for the presented analyses were based on the

least amount of missing data and consisted of self-reported depressive symptoms, antidepressant therapy, or a combination of both.

In conclusion, our findings indicate that about 40% of those with a sexual disorder of desire, arousal, or orgasm have concurrent depression. As this study was cross-sectional, it cannot determine causality versus comorbidity. However, our findings stress the importance of evaluating depression along with sexual problems in routine clinical practice and epidemiology research.

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