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FEMALE SEXUAL FUNCTION

A Survey of Female Sexual Functioning in the General Dutch Population



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ABSTRACT

**Background:** After the diagnosis and treatment of disease, a major barrier to research on psychosexual functioning is the lack of a consistent estimate for the prevalence of female sexual dysfunction in the general population.

**Aim:** To clarify the prevalence of age-related female sexual functioning in the general population.

**Methods:** A sample was compiled by random selection of women from the general population in the northern part of the Netherlands and was categorized by age. Women completed the Female Sexual Function Index (FSFI), personal medical items and daily activities, the Body Image Scale, the SF-36 Health Survey, the Hospital Anxiety and Depression Scale, and the Multidimensional Fatigue Inventory. Participants' representativeness was assessed by comparing their characteristics with data from the Dutch Central Agency for Statistics and the Dutch Health Monitor. General health, fatigue, and well-being were compared with national or international data.

**Outcomes:** Age-related total and domain scores of the FSFI.

**Results:** We evaluated female sexual functioning of 521 sexually active women. For women 20 to 80 years old, sexual functioning showed wide variance and was poor in 28% of all sexually active women, with FSFI scores being below the defined clinical cutoff (FSFI score < 26.55). Although sexual activity and functioning significantly decreased with increasing age, sexual satisfaction decreased only non-significantly.

**Clinical Implications:** This study provides valuable age-specific ranges for female sexual functioning in the general population and can inform upcoming clinical studies.

**Strengths and Limitations:** This is the largest study on female sexual function in a representative Dutch population using internationally validated tools and described by age categories, providing valuable information that can help in the understanding of how female sexual function changes with age. The FSFI has been criticized for not assessing personal distress related to sexual problems, so the lack of the Female Sexual Distress Scale in our study is an unfortunate shortcoming. The high rate of sexual inactivity (31%) resulted in fewer women being available to evaluate sexual functioning, but this could reflect the actual level of sexual (in)activity among women in a general population.

**Conclusion:** FSFI total and domain scores showed wide variation across all age categories, but overall, one in four sexually active women scored below the diagnostic cutoff score. Sexual activity and functioning also decreased with age, whereas sexual satisfaction decreased only slightly. **Lammerink EAG, de Bock GH, Pascal A, et al. A Survey of Female Sexual Functioning in the General Dutch Population. J Sex Med 2017;42:937–949.**

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**Key Words:** Sexual Functioning; Age-Related Sexual Functioning; Sexual Dysfunction; Sexual Satisfaction; Female; General Population

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## INTRODUCTION

Sexual functioning is an important factor in quality of life, and there is an explicit relation between sexual dysfunction and psychological distress.<sup>1</sup> Female sexual dysfunction has been defined as a multi-causal and multidimensional problem with four major components that indicate disorders of desire, arousal, orgasm and sex-related pain.<sup>2</sup> Defining female sexual functioning by these four domains enables focused diagnosis and treatment of sexual dysfunction. However, during the development of the Female Sexual Function Index (FSFI), a validated self-report measurement of female sexual functioning, individual items were assigned to desire and arousal, lubrication, orgasm, satisfaction, and pain. After clinical consideration, the desire and arousal domain was separated, which resulted in an instrument with six domains.<sup>3</sup> In addition, a diagnosis of sexual dysfunction requires that the condition must cause significant personal distress.<sup>2</sup>

To date, there has been no consistent estimate of the prevalence of any aspect of female sexual dysfunction. Indeed, there is substantial variability in the existing literature, with measurements of sexual dysfunction and timeframes often differing among studies.<sup>4–6</sup> In addition, sexual activity and sexual function reportedly decrease with age<sup>7–9</sup> and a host of characteristics, including educational level, relationship quality, depression, anxiety, general health, fatigue, and body image,<sup>10–15</sup> are known to affect female sexual function. However, a major barrier to the provision of effective psychosexual counseling is the lack of data about sexual functioning by age in the general population. The FSFI is a validated tool that can be used for this purpose.

We present data on female sexual functioning in a sample from the general population. Because age is a major determinant of female sexual function, we also present the results by 10-year age categories. We anticipated that large-scale data, specifically in a sample from the general population, could not only improve our understanding of age-related female sexual functioning but also provide reference values for use in future clinical studies on this topic.

## METHODS

### Study Design

We compiled a representative sample of adult women from a population in the north of the Netherlands. Women from four age categories (20–40, 40–65, 65–80, and  $\geq 80$  years old) were approached to participate, with numbers per category predetermined by matching to the normal age distribution in the Dutch population. Data were collected from four midsize towns, one in each of four provinces in the north of the Netherlands, to ensure a normal geographic distribution of participants. Local authorities provided a random selection of inhabitants within each of these age categories.

We sent questionnaires by post to women 20 to 100 years old. Women were asked to complete the questionnaires by pen and to return them by post in an envelope that we provided. No

additional instructions were given. To maximize the response rate, media attention was generated through local newspapers by explaining the purpose of the study and by stressing that participation and data processing would be anonymous. All questionnaires were sent in September 2012, and their return was requested within 2 months. To retain anonymity of the responders, no reminder letters were sent.

The study was analyzed at the University Medical Center Groningen (Groningen, The Netherlands), where the medical ethical committee concluded that approval was unnecessary because the involved participants were not patients. The local authorities of the four participating towns were informed about the purpose and contents of the study by email, were invited to participate, and were asked to provide the addresses of female inhabitants at random by age category. In a letter accompanying the questionnaire, the inhabitants selected for participation were informed about the purpose of the study, the way their address was received, and the methods used to ensure anonymity. The names and addresses of inhabitants were not included with the questionnaires.

### Questionnaires

The Supplement presents an overview of the questionnaire used for this study. In addition to the questions of the FSFI, all participants were asked questions about personal characteristics, medical information, daily activities, body image, general health, well-being, and fatigue.

### Female Sexual Function Index

This questionnaire assesses female sexual function by focusing on six domains: desire, subjective arousal, lubrication, orgasm, satisfaction, and pain and discomfort.<sup>3</sup> Desire is the only domain without an optional zero score, and all individual domain scores can be derived from a computational formula for the total FSFI score.<sup>3</sup> A FSFI total score of 26.55 is defined as the cutoff score for differentiating women with from women without low sexual function, with scores above the cutoff indicating good sexual functioning.<sup>16</sup> To derive appropriate total scores, the FSFI was analyzed only for participants who engaged in some sexual activity during the measurement period.

### SF-36 Health Survey

This questionnaire assesses general health and consists of 36 questions organized into eight multi-item scales: physical functioning, role limitations from physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations from emotional problems, and general mental health. There are standardized response choices per item, and all scale scores are converted to a scale of 0 to 100, in which higher scores indicate higher levels of functioning or well-being.<sup>17</sup>

### Hospital Anxiety and Depression Scale

The 14-item Hospital Anxiety and Depression Scale (HADS) was used to report well-being. Developed by Zigmond and

Snaith<sup>18</sup> in 1983, this scale aims to detect emotional disorders in patients undergoing investigation or treatment in medical and surgical departments. The questionnaire is composed of a seven-item anxiety subscale and a seven-item depression subscale, each with four response options from 0 to 3. The total score per subscale is calculated as the sum of these scores and ranges from 0 to 21. For interpretation, a score of 0 to 7 indicates no anxiety or depression, a score of 8 to 10 indicates doubtful or possible anxiety or depression, and a score of 11 to 21 indicates probable anxiety or depression.<sup>18</sup>

### Body Image Scale

The Body Image Scale (BIS) is a brief and validated questionnaire for assessing changes in body image in patients with cancer and is suitable for use in clinical trials.<sup>19</sup> For the present study, we excluded questions related to the effect of cancer or cancer treatment, so participants completed only 5 of the 10 questions.

### Multidimensional Fatigue Inventory

The Multidimensional Fatigue Inventory (MFI) is a 20-item self-report instrument designed to measure fatigue.<sup>20</sup> Items are rated on scales from 1 to 5, with the total score calculated as the sum of all scores. Therefore, the overall score ranges from 20 to 100, with higher scores indicating higher levels of fatigue.

The shortened version of the BIS used in the present study has not been validated, because we excluded questions on cancer that were considered irrelevant for use when assessing the general population. However, the other questionnaires are well-known and validated tools for describing different aspects of a patient's quality of life.

The main outcomes of interest were the total and domain scores of the FSFI by age category.

### Statistical Analysis

In this study, we analyzed the sexual functioning of participants who had some level of sexual activity in the month preceding the assessment point. Women who answered "no sexual activity" to any question on the FSFI were considered sexually inactive. We evaluated the reliability of each questionnaire by calculating Cronbach  $\alpha$  values. Descriptive statistics were used to present the personal and medical data of all participants and of sexually active participants separately.

The representativeness of participants was evaluated by comparing their basic characteristics with those recorded in the Dutch Central Agency for Statistics 2012 and the Dutch Health Monitor 2012.<sup>21,22</sup> The general health scores were compared with a Dutch national sample,<sup>17</sup> and the MFI and HADS scores were compared with German normative data<sup>23,24</sup> because no data were available in a Dutch population. Personal characteristics and medical characteristics about stimulants were compared by  $\chi^2$  test. Medical characteristics about fatigue, anxiety and depression, and general health were compared by unpaired t-test.

To assess female sexual functioning in sexually active women in our general population, we calculated the median (5th and 95th percentiles) and mean (SD) of the individual domain and total scores of the FSFI. Scores were considered missing when a woman did not answer all questions within a given domain, and we excluded that domain score and the corresponding overall score from further analysis. To test the change in sexual functioning by age, one-way analysis of variance was used for continuous indicators and  $\chi^2$  test was used for the dichotomous outcome (low sexual function). In addition, the percentages of women reporting no sexual activity during the measurement period were presented with 95% CIs and that group's data for the desire domain of the FSFI. The  $\chi^2$  test was applied to test the change in sexual activity by age.

All statistical analyses were performed using IBM SPSS 22.0 for Windows (IBM Corp, Armonk, NY, USA).

## RESULTS

We sent 809 questionnaires per town, resulting in a total of 3,236 questionnaires being sent. Per town, this equated to 264 questionnaires being sent to women 20 to 40 years old, 380 to women 40 to 65 years old, 123 to women 65 to 80 years old, and 42 to women at least 80 years old. In total, 829 of the 3,236 invited women returned their questionnaires, for a response rate of 26%. Of these, 654 (79%) fully completed the FSFI. The overall response rates by age categories were 24%, 29%, 24%, and 14% for women 20 to 40, 40 to 65, 65 to 80, and at least 80 years old, respectively; the corresponding percentages of fully completed FSFI questionnaires were 86%, 83%, 61%, and 21%. Responding sexual active women almost always completed the full FSFI questionnaire (99.7%). Sexually active women older than 80 years were excluded from the analyses because the small number was deemed unrepresentative.

### Representativeness of Study Population

Personal and demographic characteristics are presented in [Table 1](#). The median age was 48 years (range 21–98 years) and 99% were native to the Netherlands. Only 1% of women self-reported as homosexual and only 1% self-reported as bisexual. Except for an under-reporting by immigrants and a significant difference in the distribution of religion, personal characteristics of the total study group were comparable to those of the Dutch Central Agency.<sup>21</sup> As presented in [Table 2](#), use of alcohol and tobacco in the total study group was comparable to the Dutch Health Monitor data.<sup>22</sup> The Cronbach  $\alpha$  coefficients for the shortened BIS, MFI, HADS, and SF-36 were 0.86, 0.94, 0.90, and 0.94, respectively. The mean BIS score was 2.63 for 820 women and showed a tendency to decrease with increasing age, indicating that women had fewer body image concerns as they aged. The mean MFI total score for 740 women was significantly higher than the German normative data ( $P = .02$ ).<sup>23</sup> The mean

**Table 1.** Characteristics of participants compared with women from the DCA\*

	Sexually active group (n = 527), n (%)	TSG (N = 829), n (%)	DCA 2012, %	TSG vs DCA
Age (y)				
Median (range)	44 (21–91)	48 (21–98)	—	
5th percentile	24	24	—	
95th percentile	68	75	—	
Category				$\chi^2_3 = 1.2, P = .76$
20–40	198 (38)	252 (31)	32	
40–65	284 (54)	436 (53)	47	
65–80	38 (7)	109 (13)	16	
≥80	2 (0.4)	24 (3)	5	
Missing	5 (1)	8 (1)	—	
Nationality				
Dutch	514 (99)	811 (99)	79	$\chi^2_1 = 20.4, P < .0001$
Other	6 (1)	7 (1)	21	
Missing	7 (1)	11 (1)	—	
Marital status <sup>†</sup>				
Living with partner	447 (85)	618 (75)	83	$\chi^2_1 = 1.9, P = .17$
Living alone	78 (15)	209 (25)	17	
Missing	2 (0.4)	2 (0.2)	—	
Sexuality				
Heterosexual	511 (99)	782 (98)	—	
Homosexual	2 (0.4)	5 (1)	—	
Bisexual	6 (1)	8 (1)	—	
Missing	8 (2)	34 (4)	—	
Educational level <sup>‡,§</sup>				
Low	155 (30)	303 (37)	27	$\chi^2_2 = 7.8, P = .2$
Intermediate	193 (37)	284 (35)	54	
High	171 (33)	231 (28)	18	
Missing	8 (2)	11 (1)	0.6	
Employment status <sup>§</sup>				
Job with salary	366 (73)	494 (63)	61	$\chi^2_1 = 0.09, P = .8$
No salary	135 (27)	295 (37)	39	
Missing	26 (5)	40 (5)	—	
Religion				
No religion	256 (49)	386 (48)	42	$\chi^2_3 = 13.97, P = .003$
Catholic Christian	70 (14)	116 (14)	29	
Protestant Christian	187 (36)	298 (37)	19	
Muslim	3 (0.6)	3 (0.4)	5	
Jewish	1 (0.2)	3 (0.4)	—	
Hindu	1 (0.2)	2 (0.2)	—	
Missing	9 (2)	21 (3)	—	

DCA = Dutch Central Agency for Statistics; TSG = total study group.

\*Percentages are valid percentages rounded to whole values in this study group.

<sup>†</sup>Persons with a one-person household. These persons can have a relationship without living together.

<sup>‡</sup>Low = primary school, lower vocational education, or intermediate secondary education; intermediate = higher secondary education, pre-university secondary education, or intermediate vocational education; high = higher vocational education or university education.

<sup>§</sup>Educational level and employment status according to the DCA for women 15 to 65 years old.

anxiety subscale score of the HADS was comparable to that reported in the German normative data ( $P = .20$ ), but our study group had a significant lower mean depression score ( $P < .0001$ ), although there were no significant differences in

scores above the clinical cutoff for doubtful ( $P = .06$ ) or probable ( $P = .15$ ) depression.<sup>24</sup> The mean SF-36 total score was significantly higher than that reported in a national Dutch normative sample ( $P = .01$ ).<sup>17</sup>

**Table 2.** Medical characteristics of participants vs women from the DHM

	Sexually active group (N = 527), n (%)	TSG (N = 829), n (%)	DHM 2012, women ≥ 19 y, %	TSG vs DHM
<b>Stimulants</b>				
Smoking	120 (33)	179 (33)	20	$\chi^2_1 = 2.8, P = .10$
Cigarettes/wk, mean $\pm$ SD (range)	61 $\pm$ 43.1 (1–175)	60 $\pm$ 40.1 (1–175)	–	
Alcohol consumption	311 (85)	459 (85)	77	$\chi^2_1 = 2.1, P = .15$
Drinks/wk, mean $\pm$ SD (range)	5 $\pm$ 4.2 (1–25)	5 $\pm$ 4.7 (1–30)	–	
Drugs	7 (2)	9 (1)	–	
Missing	163 (31)	287 (35)	–	
<b>Morbidity</b>				
None	209 (40)	290 (35)	–	
Asthma, bronchitis, COPD	54 (10)	92 (11)	10	
Hypertension	52 (10)	113 (14)	20	
Cardiac disease	3 (1)	11 (1)	–	
Skin disease	48 (9)	73 (9)	–	
Type 1 DM	3 (0.6)	4 (0.5)	6 (type 1 + 2 DM)	
Type 2 DM	11 (2)	24 (3)	6 (type 1 + 2 DM)	
Thyroid disease	32 (6)	62 (7)	–	
Chronic bowel disease	10 (2)	21 (3)	6	
Psychological or psychiatric disease	38 (7)	69 (8)	–	
Malignancy	27 (5)	50 (6)	2	
Missing	7 (1)	13 (2)	–	
<b>Body Image Scale</b>				
Mean score	2.61	2.63	–	
Missing, n	4	9	–	
<b>Multidimensional Fatigue Inventory</b>				
Mean score	43.3	44.5	Schwarz et al <sup>23</sup>	TSG vs Schwarz et al <sup>23</sup> $P = .02$
Missing, n	41	89	–	
<b>Hospital Anxiety and Depression Scale</b>				
<b>Anxiety</b>				
Mean score	4.7	4.8	5.0	$P = .20$
Score $\geq$ 8, %	18.3	19.1	23.2	$\chi^2_1 = 0.48, P = .49$
Score $\geq$ 11, %	8.1	9.2	8.1	$\chi^2_1 = 0.06, P = .8$
Missing, n	7	17	–	
<b>Depression</b>				
Mean score	2.9	3.2	4.7	$P < .0001$
Score $\geq$ 8, %	10.4	13.1	23.5	$\chi^2_1 = 3.49, P = .06$
Score $\geq$ 11, %	2.9	3.6	9.3	$\chi^2_1 = 2.06, P = .15$
Missing, n	9	19	–	
<b>General Health (SF-36)</b>				
Mean score	80.9	79.6	Aaronson et al <sup>17</sup>	TSG vs Aaronson et al <sup>17</sup> $P = .01$
Missing, n	44	108	–	

COPD = chronic obstructive pulmonary disease; DHM = Dutch Health Monitor; DM = diabetes mellitus; TSG = total study group.

### Sexually Inactive Population

Thirty-one percent of our population reported no sexual activity. Although the percentage of sexually inactive women remained stable until 50 years of age, it increased exponentially after that age. The percentages of sexually inactive women per 10-year age category are listed in Table 3 and

significantly increased with age ( $P < .0001$ ). The median sexual desire score of the sexually inactive women was 1.8 (compared with 3.6 in the sexually active group). This was stable from 20 to 50 years of age (2.4–3.0), before it decreased sharply to a stable but low level from 50 to 100 years (median = 1.2).

**Table 3.** Sexual inactivity in study population

	Age (y)								Change with age
	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	
Sexually active, n	95	119	130	114	52	11	0	1	
Sexually inactive, n	24	22	31	63	56	32	7	2	
Missing, n	8	3	8	15	10	11	7	0	
Sexually inactive, %	20	16	19	36	52	74	100	67	$\chi^2_7 = 111, P < .0001$
95% CI (sexually inactive)	7.2	6.1	6.1	7.1	9.4	13.1	0	4.1	

### Female Sexual Functioning Among Sexually Active Women

The prevalence of low sexual function based on the FSFI cutoff score of 26.55 was 28% (95% CI = 24–32). The Cronbach  $\alpha$  coefficient for the total FSFI score was 0.81, and the coefficients for the desire, arousal, lubrication, orgasm, satisfaction, and pain domain scores were 0.81, 0.84, 0.89, 0.83, 0.85, and 0.89, respectively. Thus, there was high inter-item correlation. Among sexually active women, the total and domain scores of the FSFI indicated a distinct decrease in sexual function with age, particularly after menopause (Table 4, Figure 1). However, although all domain scores decreased significantly with age, this was not the case for the sexual satisfaction domain, which decreased less and only non-significantly ( $P = .12$ ; Table 4, Figures 2–7). Also, although the pain score was very stable for sexually active women until 70 years of age, it decreased sharply thereafter. Overall, the FSFI total and domain scores varied markedly among sexually active women (Figures 1–7).

## DISCUSSION

### Main Results

There was a wide range in the total and domain scores of the FSFI in all age categories, but there was a significant decrease of sexual function with increasing age. Interestingly, only sexual satisfaction decreased non-significantly as age increased. Consistent with the increase of low sexual function with increasing age, there was a corresponding significant decrease of sexual activity. The pain score of sexually active women was very stable until 70 years of age, with a sharp decrease afterward. However, it should be noted that inclusion of only sexually active women would have affected these results, because pain might have been the reason to become sexually inactive. In the study population, 31% of women were sexually inactive, with the percentage being stable at 20% until 50 years of age, after which sexual activity decreased sharply.

According to the FSFI cutoff score proposed by Wiegel et al,<sup>16</sup> the prevalence of low sexual function was 28% (95% CI = 24–32) in our sexually active population. In the existing literature, wide variation has been presented in the prevalence of sexual dysfunction, probably because of differences in the populations, age categories, definitions, and questionnaires used.<sup>4</sup>

In a Dutch national screening study in 2011, which used an adapted version of a Dutch questionnaire for identifying sexual dysfunction, 27% of women were diagnosed with a sexual dysfunction<sup>15</sup> compared with 40% of women in the United States,<sup>25</sup> 54% in the United Kingdom,<sup>26</sup> 61% to 71% in Australia,<sup>27,28</sup> and 59.5% in the Middle East.<sup>29</sup> The Prevalence of Female Sexual Problems Associated with Distress and Determinants of Treatment Seeking (PRESIDE) study in the United States also indicated that approximately 40% of women had sexual problems, 22% had sex-related personal distress, and 12% had sexual problems associated with that personal distress.<sup>8</sup>

Using a single cutoff score to define female sexual dysfunction, regardless of age, fails to do justice to the multidimensional nature of female sexual function. As shown in our data of female sexual functioning in a general population, such an approach certainly fails to take into account the strong influence of menopausal status and aging and the level of sexual satisfaction experienced by older women. Moreover, a single cutoff score does not acknowledge the wide range of scores that exists throughout such a population, leading us to conclude that there can be no such thing as a “normal” score for the entire population. Given the large variation in the total and domain scores of the FSFI, defining a single “normative” value is inappropriate; rather, it would appear more appropriate to use several “age-related normative ranges.”

### Strengths and Limitations

To the best of our knowledge, this is the largest study on female sexual functioning in a representative Dutch population using internationally validated tools. As recently described by McCabe et al,<sup>4</sup> there is limited literature on the prevalence of most aspects of female sexual dysfunction, and the literature that does exist shows substantial variability. Cultural background, age, sample source, and methodology have been suggested as areas that need to be described clearly and used consistently across samples.<sup>4</sup> In our study, we gathered data about female sexual function from a representative demographic sample matching a northern Dutch population, we used validated tools, and we clearly described the data collection strategy. Moreover, the representativeness of the sample was evaluated by comparing participant characteristics against a national reference database. Except for an under-reporting by

**Table 4.** Female Sexual Function Index domain and total scores in sexually active women, stratified by age

	Age (y)						Change with age
	20–30	30–40	40–50	50–60	60–70	70–80	
<b>Desire</b>							
n (missing)	95 (0)	119 (0)	130 (0)	113 (1)	51 (1)	11 (0)	
Median	3.6	3.6	3.6	3.0	3.0	2.4	
5th percentile	2.3	1.8	2.4	1.2	1.8	2.4	
95th percentile	4.9	5.4	4.8	5.0	4.4	3.0	
Mean	3.6	3.5	3.5	3.1	3.0	2.7	$F_5 = 7.2, P < .0001$
SD	0.90	0.98	0.85	0.98	0.81	0.41	
<b>Arousal</b>							
n (missing)	95 (0)	119 (0)	130 (0)	114 (0)	52 (0)	11 (0)	
Median	5.4	5.4	5.1	4.5	4.4	3.3	
5th percentile	3.8	3.3	3.5	2.7	2.4	1.5	
95th percentile	6.0	6.0	6.0	6.0	6.0	4.8	
Mean	5.2	5.2	5.0	4.4	4.4	3.5	$F_5 = 20.6, P < .0001$
SD	0.72	0.79	0.85	1.08	1.08	1.01	
<b>Lubrication</b>							
n (missing)	95 (0)	119 (0)	130 (0)	114 (0)	52 (0)	11 (0)	
Median	5.7	6.0	5.7	5.0	4.8	3.6	
5th percentile	3.9	3.9	3.2	2.3	1.2	2.4	
95th percentile	6.0	6.0	6.0	6.0	6.0	4.8	
Mean	5.5	5.6	5.3	4.7	4.4	3.9	$F_5 = 20.0, P < .0001$
SD	0.74	0.66	1.00	1.20	1.52	1.12	
<b>Orgasm</b>							
n (missing)	95 (0)	119 (0)	130 (0)	114 (0)	52 (0)	11 (0)	
Median	5.2	5.6	5.4	4.8	4.8	3.6	
5th percentile	2.0	2.0	2.8	2.4	2.7	2.4	
95th percentile	6.0	6.0	6.0	6.0	6.0	4.4	
Mean	4.9	5.0	5.0	4.8	4.8	3.7	$F_5 = 3.4, P = .005$
SD	1.24	1.25	1.11	1.19	1.15	1.04	
<b>Satisfaction</b>							
n (missing)	95 (0)	119 (0)	130 (0)	114 (0)	52 (0)	11 (0)	
Median	5.2	5.2	5.2	5.2	4.8	4.4	
5th percentile	3.0	2.8	3.2	3.5	2.8	2.0	
95th percentile	3.0	6.0	6.0	6.0	6.0	5.2	
Mean	5.1	5.1	5.1	5.1	4.8	4.4	$F_5 = 1.8, P = .117$
SD	0.99	1.04	0.92	0.91	1.07	1.16	
<b>Pain</b>							
n (missing)	95 (0)	119 (0)	130 (0)	114 (0)	52 (0)	11 (0)	
Median	6.0	6.0	6.0	6.0	6.0	4.4	
5th percentile	2.4	3.2	3.4	3.6	1.6	3.2	
95th percentile	6.0	6.0	6.0	6.0	6.0	5.6	
Mean	5.1	5.6	5.6	5.4	5.1	4.5	$F_5 = 5.2, P < .0001$
SD	1.22	0.87	0.83	0.90	1.42	1.08	
<b>Total score</b>							
n (missing)	95 (0)	119 (0)	130 (0)	113 (1)	51 (1)	11 (0)	
Median	30.2	31.0	30.8	28.7	26.1	22.2	
5th percentile	22.5	20.7	21.4	19.5	15.4	16.7	
95th percentile	34.0	34.5	34.2	34.1	33.8	27.9	
Mean	29.4	30.1	29.4	27.6	26.3	22.7	$F_5 = 13.1, P < .0001$
SD	3.99	3.90	3.91	4.63	5.10	4.63	
Score $\leq 26.55$ , n (%)	19 (20)	20 (17)	27 (21)	44 (39)	28 (55)	9 (82)	$\chi^2_5 = 54.2, P < .0001$



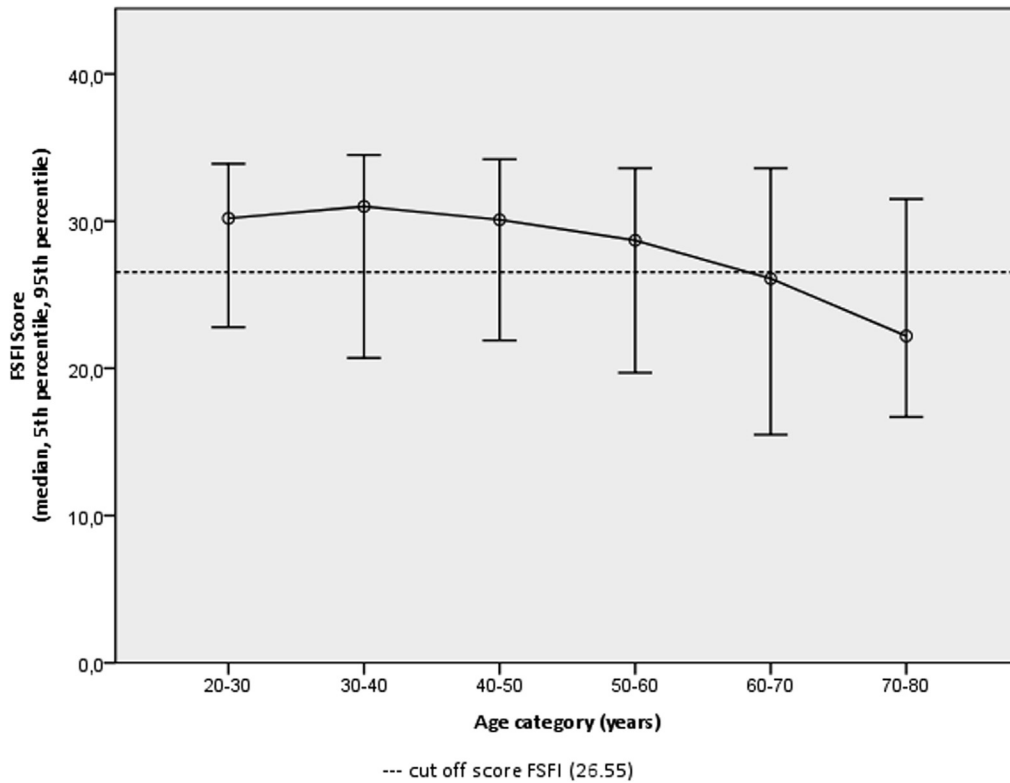


Figure 1. FSFI score according to age.

immigrants and a difference in the distribution of religion, the personal characteristics of our total study group were comparable to those of the Dutch Central Agency.<sup>21</sup> Possible

explanations for the under-reporting of immigrants might be the uneven distribution of immigrants in certain parts of the Netherlands and a response bias owing to language and cultural

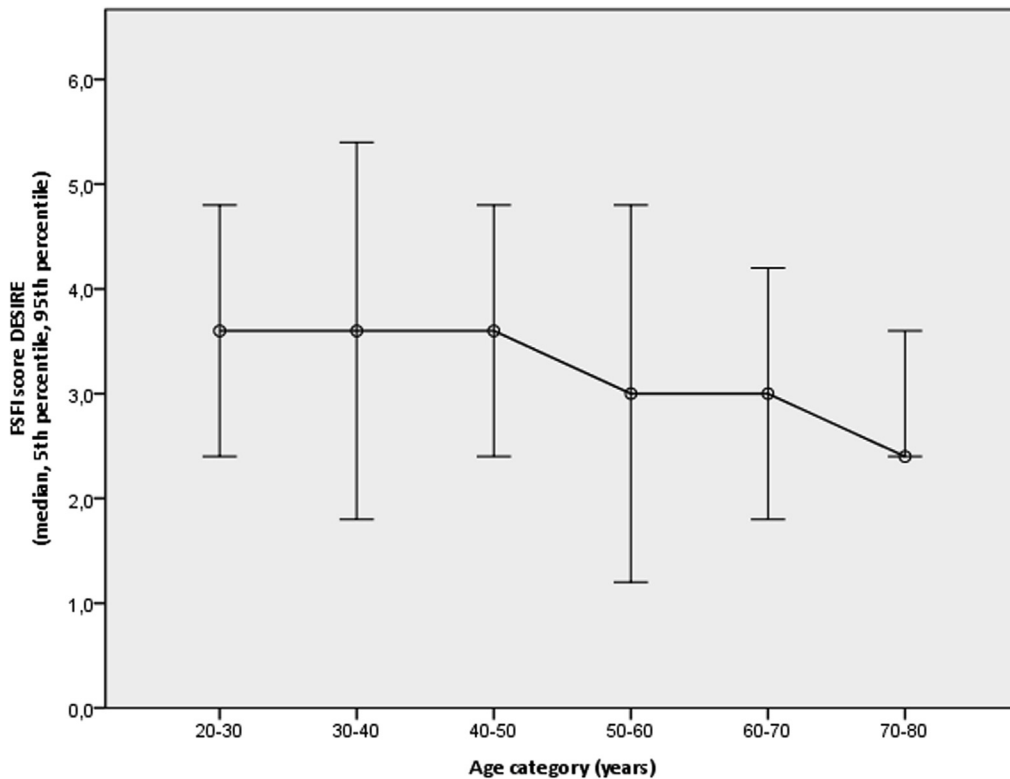


Figure 2. FSFI desire domain score according to age.

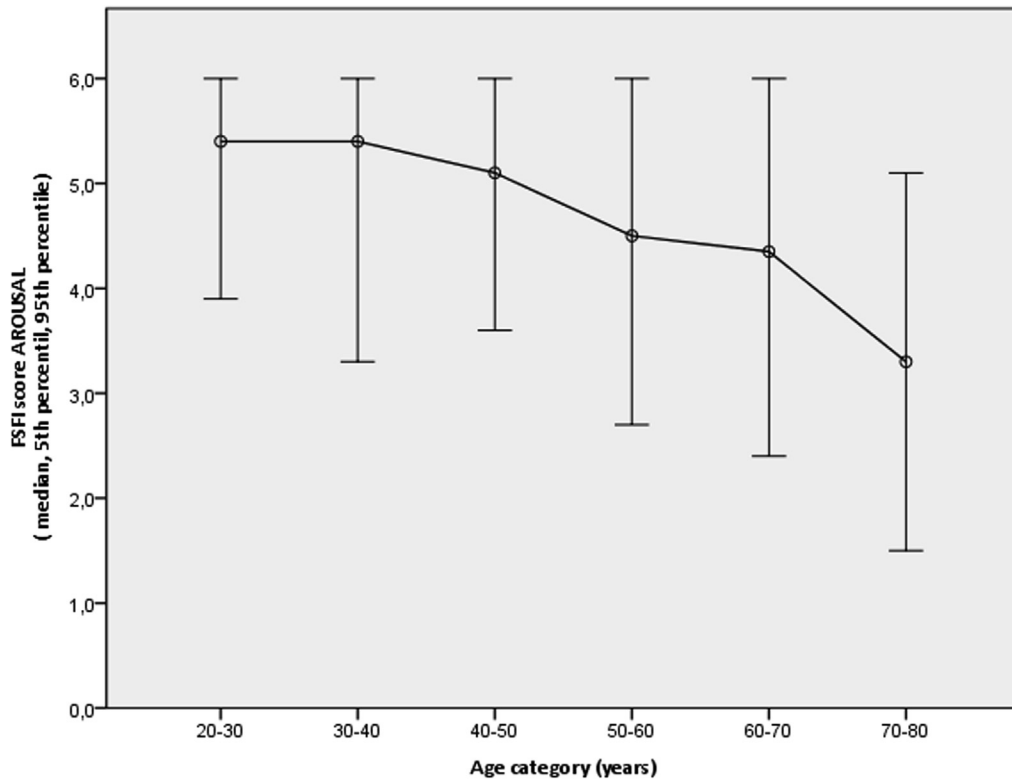


Figure 3. FSFI arousal domain score according to age.

barriers, making it difficult or impossible to complete the questionnaire. A reliable explanation for the difference in the distribution of religion is the agglomeration of different

regions in subparts of the Netherlands. We also added questionnaires covering anxiety, depression, fatigue, well-being, and general health, because these factors are known to affect female

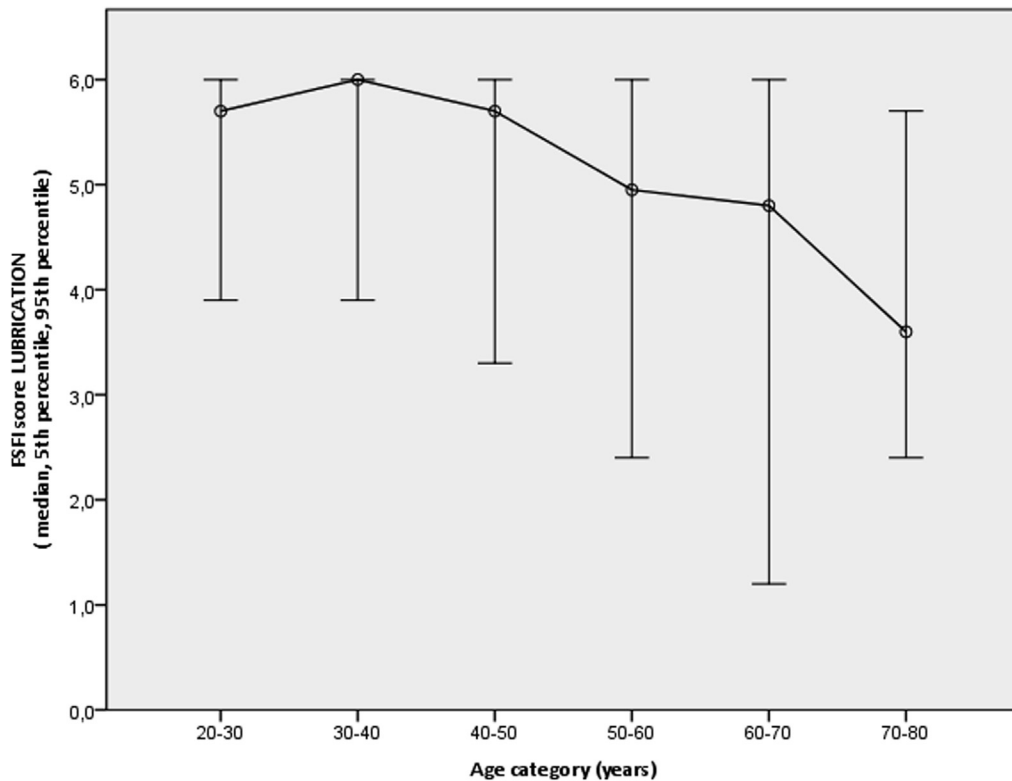


Figure 4. FSFI lubrication domain score according to age.

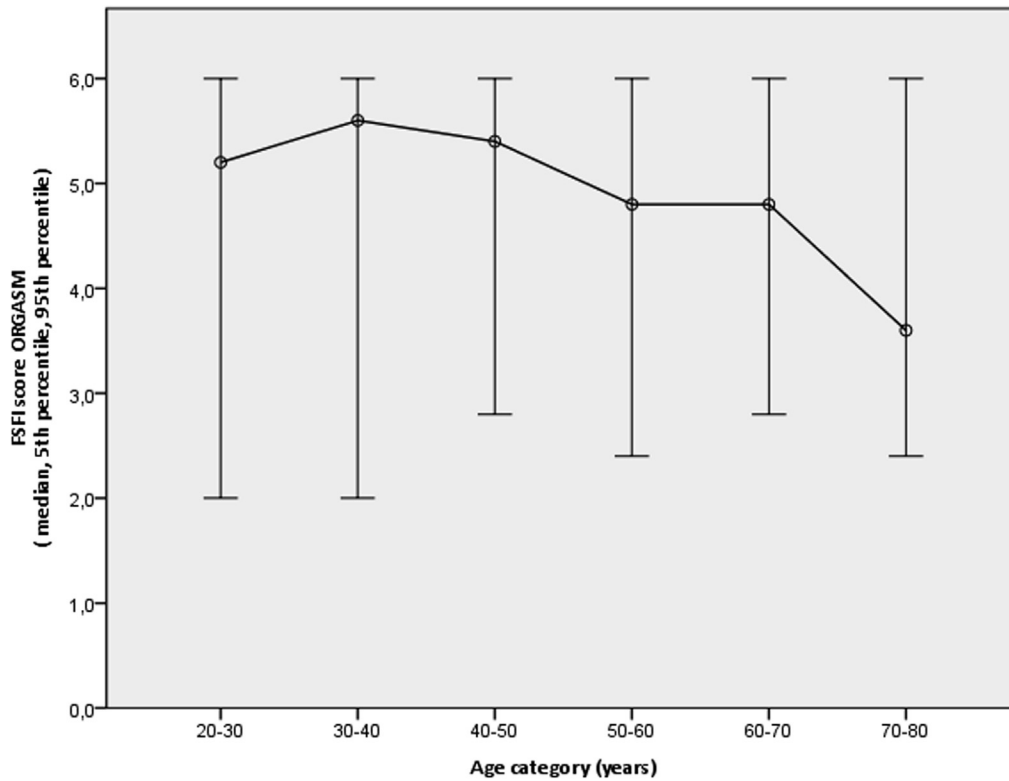


Figure 5. FSFI orgasm domain score according to age.

sexual functioning.<sup>10–14</sup> For example, Johannes et al<sup>30</sup> showed that approximately 40% of women with disordered sexual desire, arousal, or orgasm also had concurrent depression. Despite

significant differences in the mean scores on fatigue and general health between our total study group and (inter)national reference data, we do not believe these differences are of clinical relevance.

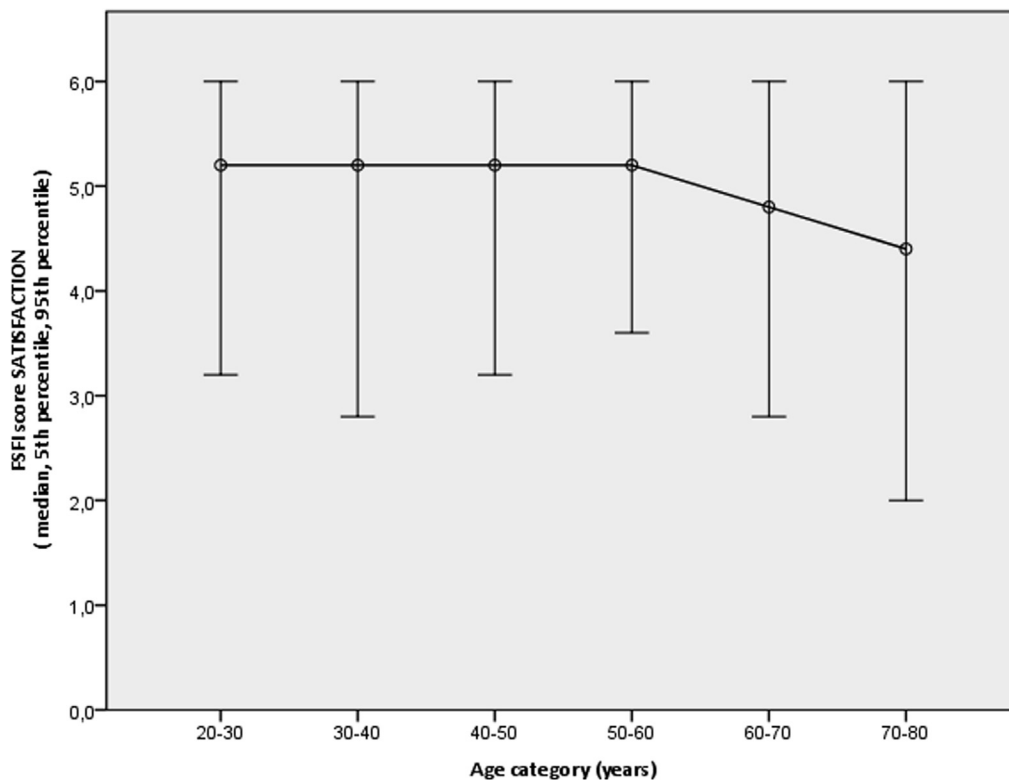


Figure 6. FSFI satisfaction domain score according to age.

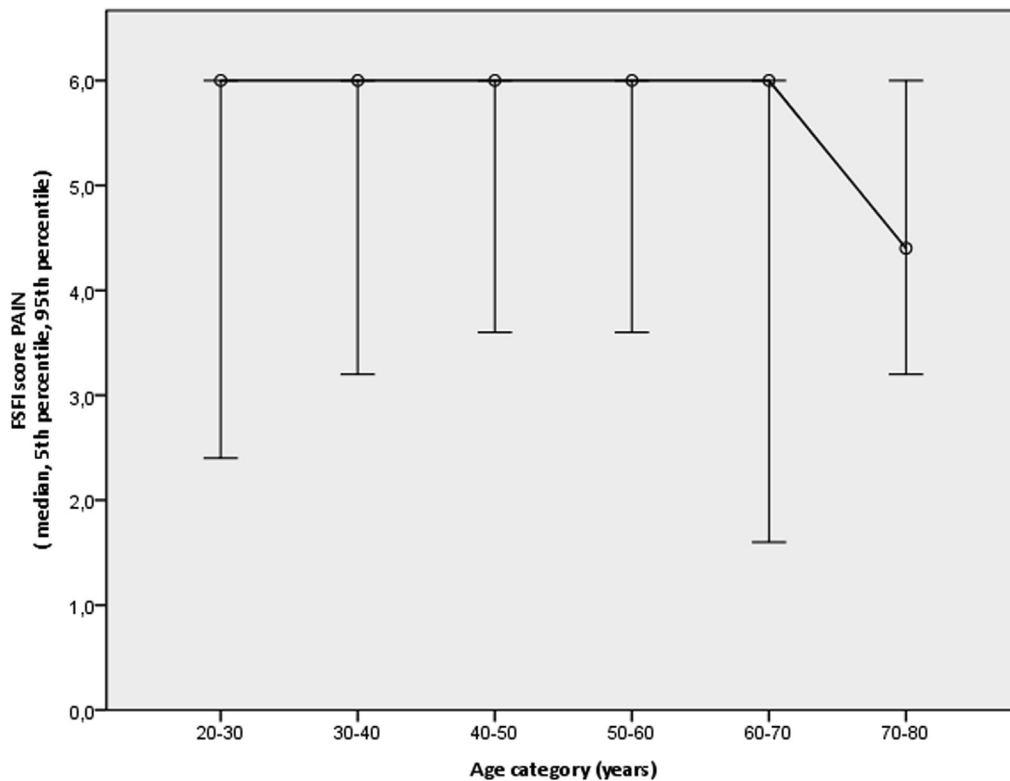


Figure 7. FSFI pain domain score according to age.

There are no general accepted cutoff scores of fatigue in the literature, but the mean score in our total study group was less than two points higher and between the 50th and 75th percentile of the mean score in German reference data.<sup>23</sup> In the absence of clinical cutoff scores of the SF-36, we can conclude that, on a scale of 0 to 100, a difference of 2.5 points in the mean score of our total study group and the Dutch norming data has no clinical relevance.<sup>17</sup> To avoid bias from measurement error, we also validated the reliability of these questionnaires. Although the shortened version of the BIS that we used had not previously been validated (because we excluded questions about cancer), the reliability of each questionnaire was high. Indeed, the Cronbach  $\alpha$  values were at least 0.80 for all questionnaires in this study.

We described female sexual functioning by age category and found wide variance in all domains of sexual function. We also performed this study according to the most recent international classification system described by Basson et al,<sup>2</sup> so the large and representative sample provides valuable information that can help in the understanding of how female sexual function changes with age. Indeed, the age-related ranges for sexual functioning in the FSFI in our general population could provide reliable reference values for use in future clinical studies about effects of different treatments on female sexual functioning. For example, most, if not all, gynecologic disorders diagnosed and treated in clinical practice can affect female sexual functioning.<sup>31–34</sup> We believe that our data about sexual functioning in a general population set

a standard that will allow sexual functioning to be compared among gynecologic patients in age-matched populations. Ultimately, it is hoped that this will improve the accuracy of scientific knowledge provided to patients.

The *Diagnostic and Statistical Manual of Mental Disorders* requires that a sexual disturbance cause distress or interpersonal difficulty for it to be diagnosable as a disorder, and the Female Sexual Distress Scale was specifically developed to measure that distress.<sup>35</sup> Because we did not include this scale in our study, we could not assess the prevalence of diagnosable sexual disorders. This is an unfortunate shortcoming.

Interestingly, in our study results, only sexual satisfaction showed a statistically non-significant decrease with increasing age, suggesting women might have other sexual expectations when becoming older. Consensus-based characterizations of female sexual dysfunction have emphasized personal distress as an essential component of its definition.<sup>35</sup> The FSFI has been criticized for not assessing personal distress related to sexual problems.<sup>36</sup> In routine clinical practice, it is important to take distress into account to determine how sexual function is experienced and evaluated by the individual, because personal distress reasonably will motivate patients to seek medical help.

Although advancing age is a known risk factor for sexual difficulties, sexual distress is associated with consistent levels or a U-shaped pattern with aging.<sup>7,8</sup> Alongside the Female Sexual

Distress Scale, the FSFI was specifically designed to be an assessment instrument for use in clinical trials. In the FSFI, although the strength of the relation between the desire and arousal domains was noted early in its development, it has retained these as separate categories.<sup>3</sup> However, in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, female disorders of desire and arousal were amalgamated into a single diagnosis called “female sexual interest/arousal disorder.” Nevertheless, the FSFI remains the most used and recommended questionnaire for clinical trials about female sexual function.

A common problem with sexual research is the low response rate to questionnaires, which can result in selection bias that can influence results.<sup>37</sup> This study had a response rate of 26% that decreased with increasing age, similar to that reported by other studies on sexual functioning.<sup>38,39</sup> The high rate of sexual inactivity (31%) resulted in fewer women being available to evaluate sexual functioning, but this could reflect the actual level of sexual (in)activity among women in a general population.

## CONCLUSIONS

Overall and subdomain scores on the FSFI for female sexual function varied widely among women in all age categories. Therefore, using a single cutoff score to define female sexual dysfunction without considering age does not reflect reality. Based on the FSFI, we found that 28% of sexually active women scored below the current diagnostic cutoff score of 26.55, and that sexual functioning significantly decreased with increasing age, whereas only sexual satisfaction decreased non-significantly. The domain score for pain also was stable until sexually active women reached 70 years old, after which it decreased sharply. This study provides important data on the variance in domain scores for female sexual functioning in a general population sample. We conclude that these data are suitable for use in upcoming clinical studies that consider female sexual function by age category.

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## SUPPLEMENTARY DATA

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