

COVID-19

Female Sexual Function During the COVID-19 Pandemic in the United States



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ABSTRACT

Introduction: International studies have demonstrated increasing rates of sexual dysfunction amidst the coronavirus disease 2019 (COVID-19) pandemic; however, the impact of the pandemic on female sexual function in the United States is unknown.

Aim: To assess the impact of the COVID-19 pandemic on female sexual function and frequency in the United States.

Methods: A pre-pandemic survey containing the Female Sexual Function Index (FSFI) and demographic questions was completed by adult women in the United States from October 20, 2019 and March 1, 2020. The same women were sent a follow-up survey also containing the FSFI, as well as the Patient Health Questionnaire for Depression and Anxiety with 4 items (PHQ-4), and questions pertaining to mask wearing habits, job loss, and relationship changes. Risk for female sexual dysfunction (RFSD) was defined as FSFI < 26.55.

Main Outcome Measure: Differences in pre-pandemic and intra-pandemic female sexual function, measured by the FSFI, and sexual frequency.

Results: Ninety-one women were included in this study. Overall FSFI significantly decreased during the pandemic (27.2 vs 28.8, $P = .002$), with domain-specific decreases in arousal (4.41 vs 4.86, $P = .0002$), lubrication (4.90 vs 5.22, $P = .004$), and satisfaction (4.40 vs 4.70, $P = .04$). There was no change in sexual frequency. Contingency table analysis of RFSD prior to and during the pandemic revealed significantly increased RFSD during the pandemic ($P = .002$). Women who developed RFSD during the pandemic had higher PHQ-4 anxiety subscale scores (3.74 vs 2.53, $P = .01$) and depression subscale scores (2.74 vs 1.43, $P = .001$) than those who did not. Development of FSD was not associated with age, home region, relationship status, mask wearing habits, knowing someone who tested positive for COVID-19, relationship change, or job loss and/or reduction during the pandemic.

Conclusion: In this population of female cannabis users, risk for sexual dysfunction increased amidst the COVID-19 pandemic and is associated with depression and anxiety symptoms. **Bhambhani HP, Chen T, Wilson-King AM, et al. Female Sexual Function During the COVID-19 Pandemic in the United States. Sex Med 2021;9:100355.**

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Key Words: Sex; orgasm, Intimacy; Pain; Frequency; Intercourse

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19) has led to a global pandemic which has disrupted lives and health care delivery systems across the world.^{1,2} Ever since the first shelter-in-place orders were first enacted in the United States in March 2020 in an effort to limit the spread of the virus, the social distancing protocols and shutdowns of bars, restaurants, schools, and other public-gatherings have caused significant disruption. Social normalcy has been

Received January 7, 2021. Accepted March 9, 2021.

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<https://doi.org/10.1016/j.esxm.2021.100355>

upended and many aspects of people's lives have been drastically altered including economic, social, political, as well as within the realms of individual private, intimate lives. Unemployment has risen, and with it, loss of work-related healthcare insurance; mental health impacts of increased isolation combined with economic uncertainty has worsened depression and anxiety.^{3,4} Early reports show signs of the pandemic's downstream effects impacting women differently than men: women are typically leaned on more for child-care, a need that's magnified with children learning remotely.⁵ Potentially as a result of the increased need for childcare and home schooling, recent reports suggest women are at higher risk of pandemic-related unemployment.⁶

Sexual health requires a state of well-being from women's physical, emotional, social, and mental domains.⁷ Sexual dysfunction can arise from stresses and disruptions in any of the interrelated psychological, biological, or social domains responsible for sexual health including many of which may be caused by the global pandemic.⁸ Indeed, a recent study of clinical sexologists and their patients' sexual health during the pandemic highlighted the role of mental health issues as precursors of sexual difficulties.⁹

Early surveys have sought to characterize the impacts of the pandemic on female sexual behavior. They have described large proportions of female participants reporting negative impacts on Female Sexual Function Index (FSFI) scores.¹⁰ They have drawn links between stress and loneliness experienced during the pandemic to negative evaluations of one's own sex life and they have reported lower overall levels of sexual activity.¹¹⁻¹³ However, these studies rely heavily on survey respondent recall regarding pre-pandemic function, which risks recall bias. Furthermore, a majority of these studies have been completed outside of the United States, and may not be generalizable to those living in the U.S. as every country has shown a unique medical and psychological response to the pandemic.

Our research group has been prospectively collecting sexual function data on a sexually active longitudinal patient cohort.^{14,15,16} A baseline survey was completed in November and/or December 2019 before the COVID-19 spread, which makes this a unique pre-Covid-19 dataset available for comparison. Timing of follow-up survey dissemination coincided with post-pandemic shelter-in-place, allowing for pre-pandemic and intra-pandemic analysis. The aim of the present study is to answer the question, "Is the COVID-19 pandemic associated with a decrease in female sexual function in the United States?" We hypothesized the pandemic would be associated with increased risk for female sexual dysfunction.

METHODS

Study Population

We leveraged a convenience sample of women surveyed for a separate study of sexual function which began enrollment immediately prior to the onset of the COVID-19 pandemic, between October 20, 2019 and March 1, 2020 that comprised our pre-COVID dataset.¹⁴ These were women who visited a partner cannabis dispensary

and were invited to complete an uncompensated, anonymous online survey on the Qualtrics (Provo, UT) platform. The same group of women were then invited to complete a follow-up survey during the pandemic between August 1, 2020 and October 10, 2020 within the nationwide social distancing protocol time periods, comprising the intra-pandemic dataset. Prior to beginning the survey, each participant was given a form pertaining to informed consent, and completion of the survey implied informed consent to participate in the study. Sexually inactive participants were excluded from analyses regarding sexual function due to established limitations of the FSFI in quantifying the sexual function of sexually inactive women.¹⁷ This study was approved by the Institutional Review Board at the Stanford University School of Medicine.

Survey Instruments

All participants were administered the same pre-pandemic and intra-pandemic surveys. The pre-pandemic survey has been described in detail previously and includes questions on demographic information and past medical history, as well as the FSFI.¹⁸ The FSFI is a validated questionnaire consisting of 19 questions, each scored on a Likert scale from 0/1 to 5, for a maximum total score of 36 with the following 6 domains, each worth 6 points: desire, arousal, lubrication, orgasm, satisfaction, and pain. The presence of risk for female sexual dysfunction (RFSF) was defined as an overall FSFI score less than 26.55, as previously described.¹⁸ The pandemic survey consisted of the FSFI as well as questions regarding sexual frequency, mask wearing habits, job loss during the pandemic, whether participants knew someone who tested positive, changes in relationship during the pandemic, and anxiety and/or depression symptoms during the pandemic. Anxiety and depression symptoms were evaluated using the validated Patient Health Questionnaire for Depression and Anxiety with 4 items (PHQ-4).¹⁹ The PHQ-4 is a validated screening tool for anxiety and depression consisting of two depression screening questions (PHQ-2) and two generalized anxiety disorder screening questions (GAD-2). Each question is scored on a Likert scale ranging from 0 to 3, for a total of 6 possible points for each subscore, and scores ≥ 3 for were considered anxiety or depression for their respective scales, as previously described.²⁰ The specific wording and possible answers to survey questions pertaining to the pandemic are detailed in Supplemental Table 1.

Statistical Analysis

Participant characteristics were analyzed using descriptive statistics, including proportions, median, and mean \pm standard deviations. Group differences in categorical variables were assessed by the χ^2 test or Fisher's exact test as appropriate. Normally distributed continuous variables were analyzed by Student's *t*-test, while skewed continuous variables were analyzed by the Wilcoxon rank-sum test. The internal consistency ("reliability") of the FSFI domains was assessed using Cronbach's alpha (Supplemental Table 2), and all values of Cronbach's alpha were at least 0.80, indicating good reliability. Pre-pandemic and intra-

pandemic measures of FSFI were analyzed using paired *t*-tests. Pre-pandemic and intra-pandemic measures of RFSD were compared using contingency table analysis with McNemar's test for paired categorical data. Pre-pandemic and intra-pandemic measures of sexual frequency were analyzed using the Wilcoxon signed-rank test for ordered categorical data.²¹

All data were analyzed using R v3.5.3 (R Foundation for Statistical Computing, Vienna, Austria). The significance level for all statistical tests was set at 0.05, and all tests were two-sided.

RESULTS

A total of 91 women were included in this study. Participant characteristics are summarized in Table 1. Mean participant age \pm standard deviation was 43.1 ± 11.8 years. Most women were married or in a relationship ($n = 75$, 82.4%), had normal BMI ($n = 49$, 55.7%), and had not visited their primary care provider in the last three months ($n = 49$, 53.8%). Approximately half of the cohort knew someone who tested positive for COVID-19 ($n = 45$, 49.5%) and had experienced job loss or reduction during the pandemic ($n = 46$, 50.5%). Most participants reported always wearing a face mask ($n = 61$, 67.0%) and no change in relationship status during the pandemic ($n = 75$, 82.4%). During the pandemic, 42 women (46.2%) screened positive for anxiety, and the average anxiety subscale score was 2.79 (range, 0-6). 22 women (24.2%) screened positive for depression, and the average depression subscale score was 1.77 (range, 0-6).

Paired analyses of sexual function and frequency before and during the pandemic are provided in Table 2. Overall FSFI was significantly decreased during the pandemic (27.2 vs 28.8, $P = .002$). Intra-pandemic decreases in FSFI were additionally noted for the arousal domain (4.41 vs 4.86, $P = .0002$), lubrication domain (4.90 vs 5.22, $P = .004$), and satisfaction domain (4.40 vs 4.70, $P = .04$). Subgroup analysis of FSFI among participants who did not experience job loss revealed decreases in intra-pandemic FSFI domains for arousal (4.83 vs 4.39, $P = .03$), lubrication (5.33 vs 4.94, $P = .045$), orgasm (5.03 vs 4.63, $P = .048$), with a trend toward decreased overall FSFI (29.00 vs 27.42, $P = .057$). Among the 58 women with known sexual frequency, there was no change in sexual frequency following the onset of the pandemic ($P = .81$). Contingency table analysis of RFSD prior to and during the pandemic revealed significantly increased RFSD during the pandemic (Table 3, $P = .002$).

Among participants who did not have RFSD prior to the pandemic, a comparison between those who remained without RFSD vs those who developed RFSD is provided in Table 4. Notably, women who developed RFSD had higher anxiety subscale scores (3.74 vs 2.53, $P = .01$) and depression subscale scores (2.74 vs 1.43, $P = .001$). Development of RFSD was not associated with age, home region, relationship status, mask wearing habits, knowing someone who tested positive for COVID-19, relationship change, or job loss and/or reduction during the pandemic.

Table 1. Baseline characteristics of participants

Characteristic	N (%)
Total	91 (100%)
Age (mean (SD))	43.1 (11.8)
Age	
<30	11 (12.1)
30 - 39	27 (29.7)
40 - 49	24 (26.4)
50 - 59	22 (24.2)
60+	7 (7.7)
Region	
West	32 (35.2)
International	16 (17.6)
Midwest	9 (9.9)
Northeast	20 (22.0)
South	14 (15.4)
Relationship status	
Married/In a relationship	75 (82.4)
Single	14 (15.4)
Unknown	2 (2.2)
Weight (mean (SD))	158.0 (34.6)
Height (mean (SD))	167.4 (5.8)
BMI	
Normal	49 (55.7)
Underweight	2 (2.3)
Overweight	20 (22.7)
Obese	12 (13.6)
Extremely Obese	5 (5.7)
PCP Visits in last 3 months	
0	49 (53.8)
1	29 (31.9)
2+	13 (14.3)
Know someone who tested positive	
No	46 (50.5)
Yes	45 (49.5)
Experienced Job Loss or Reduction	
No	45 (49.5)
Yes	46 (50.5)
Mask-wearing frequency	
Always	61 (67.0)
Often	17 (18.7)
Sometimes	10 (11.0)
Rarely	1 (1.1)
Never	2 (2.2)
Relationship changed during the pandemic	
No	75 (82.4)
Yes	16 (17.6)
PHQ-4 Anxiety	
No	49 (53.8)
Yes	42 (46.2)
PHQ-4 Anxiety Score (mean (SD))	2.79 (1.80)
PHQ-4 Depression	
No	69 (75.8)
Yes	22 (24.2)
PHQ-4 Depression Score (mean (SD))	1.77 (1.48)

Table 2. Comparisons of sexual frequency and function before and within the pandemic

Characteristic	Pre-pandemic	Intra-pandemic	<i>P</i> value
FSFI (mean (SD))			
Desire Domain	3.78 (1.19)	3.58 (1.12)	0.08
Arousal Domain	4.86 (1.22)	4.41 (1.25)	0.0002
Lubrication Domain	5.22 (1.18)	4.90 (1.35)	0.004
Orgasm Domain	4.98 (1.39)	4.76 (1.41)	0.10
Satisfaction Domain	4.70 (1.35)	4.40 (1.35)	0.04
Pain Domain	5.28 (1.14)	5.17 (1.10)	0.25
Overall Score	28.82 (5.67)	27.22 (5.63)	0.002

Differences in FSFI assessed using paired *t*-tests. The significance level was set at 0.05.

DISCUSSION

The present study is the first to assess sexual function and frequency among women amidst the COVID-19 pandemic in the United States. Utilizing pre-pandemic survey data as a comparison, we report an increase in female sexual dysfunction as determined by the FSFI, with no change in sexual frequency. Development of risk for female sexual dysfunction was associated with higher intra-pandemic anxiety and depression scores. There was no association between sexual function and mask wearing habits, knowing someone who tested positive, relationship status, or job loss and/or reduction during the pandemic.

Public health safety measures, ranging from physical distancing to stay-at-home orders, have been invoked across the world and are necessary to slow the spread of SARS-CoV-2. Simultaneously, however, these inherently isolating preventative measures have been linked to increased rates of depression and anxiety.²² Indeed, Ettman et al. estimated a three-fold increase in the prevalence of depression symptoms in the United States.²³ Depression, anxiety, and stress are well-established risk factors for sexual dysfunction, and it follows that rates of sexual dysfunction may be increasing given a more distressed populace. To this end, some international studies have explored changes in sexual behavior and function during the pandemic with variable findings. Observational studies of women in Italy and Turkey have demonstrated an increase in FSD and decrease in frequency of intercourse with the onset of the pandemic.^{24,25}

In a recent survey of married couples in Egypt, both men and women experienced lower sexual satisfaction during the pandemic, but women were more affected than men, likely due to relatively more anxiety and depression.²⁶ Another survey of over 1,500 adults in Italy found that most participants (71.3%) did not report any change in their sexual desire during the pandemic.²⁷ Likewise, a cross-sectional survey conducted in Bangladesh, India, and Nepal revealed that most (55%) participants did not believe pandemic lockdowns had affected their sexual life.²⁸ Given the variable nature of the pandemic in each country with regard to both infection rate and policy-level interventions, these results may not be generalizable to the United States. Accordingly, our study is an important step toward understanding the effects of the pandemic on female sexual function in the United States.

Though we report statistically significant decreases in overall FSFI score, the absolute decreases are relatively modest and therefore their clinical significance may be questioned. For example, the average decrease in the overall FSFI score during the pandemic was 1.6 points. In order to assess to clinically meaningful differences in sexual function, we used the previously validated FSFI cut-point of 26.55 to define RFSD and conducted contingency table analysis, demonstrating increased RFSD during the pandemic. Additionally, the average FSFI score of our study population is somewhat higher than the average FSFI score of other, larger studies.^{18,29} As such, our sample may be more protected from the development of RFSD because of a higher baseline sexual function, and our findings may therefore somewhat underestimate the deleterious association of the COVID-19 pandemic with female sexual function.

The direct relationship between female sexual dysfunction and depression, anxiety, and stress has been studied extensively. Many pharmacologic therapies for depression and anxiety have FSD as a potential adverse effect, but depression and anxiety are themselves, even in the absence of treatment, risk factors for FSD. One study of antidepressant-naïve patients with major depressive disorder revealed 90% of patients had FSD per the FSFI.³⁰ Similarly, a study of patients with generalized anxiety disorder receiving placebo treatment found that 46% of women had sexual dysfunction.³¹ Consistent with these results, our study finds that women who developed RFSD during the pandemic had increased depression and anxiety symptoms than women who remained without RFSD. As such, providers who encounter women presenting with sexual

Table 3. Contingency table analysis of female sexual dysfunction prior to and during the pandemic

	Intra-pandemic FSD present	Intra-pandemic FSD absent	Total	<i>P</i> value
Pre-Pandemic FSD present	17 (81%)	4 (19%)	21	0.002
Pre-Pandemic FSD absent	19 (27%)	51 (73%)	70	
Total	36	55	91	

Analysis conducted with McNemar's test for paired categorical data. The significance level was 0.05. Row percentages listed in parentheses.

Table 4. Comparison of women who developed sexual dysfunction vs those who maintained normal sexual function

Characteristic	Remained without FSD	Developed FSD	<i>P</i> value
N ^a	51	19	
Age (mean (SD))	42.86 (12.64)	44.32 (11.37)	0.66
Age			0.77
<30	9 (17.6)	1 (5.3)	
30 - 39	15 (29.4)	6 (31.6)	
40 - 49	11 (21.6)	5 (26.3)	
50 - 59	12 (23.5)	5 (26.3)	
60+	4 (7.8)	2 (10.5)	
Region			0.79
West	16 (31.4)	9 (47.4)	
International	11 (21.6)	3 (15.8)	
Midwest	5 (9.8)	2 (10.5)	
Northeast	11 (21.6)	3 (15.8)	
South	8 (15.7)	2 (10.5)	
Relationship status			0.71
Married/Relationship	41 (80.4)	14 (73.7)	
Single	9 (17.6)	4 (21.1)	
Unknown	1 (2.0)	1 (5.3)	
Weight (mean (SD))	154.39 (30.56)	165.26 (38.90)	0.22
Height (mean (SD))	166.55 (5.05)	168.84 (5.70)	0.11
BMI			0.06
Normal	30 (61.2)	6 (31.6)	
Underweight	0 (0.0)	2 (10.5)	
Overweight	10 (20.4)	7 (36.8)	
Obese	7 (14.3)	3 (15.8)	
Extremely Obese	2 (4.1)	1 (5.3)	
PCP Visits in last 3 months			0.37
0	31 (60.8)	8 (42.1)	
1	14 (27.5)	8 (42.1)	
2+	6 (11.8)	3 (15.8)	
Know someone who tested positive			0.59
No	27 (52.9)	8 (42.1)	
Yes	24 (47.1)	11 (57.9)	
Experienced Job Loss or Reduction			1.00
No	26 (51.0)	10 (52.6)	
Yes	25 (49.0)	9 (47.4)	
Mask-wearing frequency			0.79
Always	34 (66.7)	15 (78.9)	
Often	10 (19.6)	2 (10.5)	
Sometimes	5 (9.8)	2 (10.5)	
Rarely	1 (2.0)	0 (0.0)	
Never	1 (2.0)	0 (0.0)	
Relationship changed during the pandemic			0.98
No	41 (80.4)	16 (84.2)	
Yes	10 (19.6)	3 (15.8)	
PHQ-4 Anxiety Score (mean (SD))	2.53 (1.75)	3.74 (1.66)	0.01
PHQ-4 Depression Score (mean (SD))	1.43 (1.46)	2.74 (1.37)	0.001

Differences in categorical variables assessed by the χ^2 test or Fisher's exact test as appropriate. Normally distributed continuous variables were analyzed by Student's *t*-test, while others were analyzed using the Wilcoxon rank-sum test. The significance level was 0.05.

dysfunction may wish to screen for the presence of pandemic-related stressors. In light of recent evidence that demonstrates sexual activity can have a protective effect on the development quarantine-related anxiety and mood disorders, optimization of patients' sexual health and optimization of patients' mental health are reciprocal and synergistic goals.³²

This study should be considered in the context of its limitations. Though this is the first study to assess sexual function and frequency among American women during the COVID-19 pandemic, the United States is a heterogeneous nation, and the response to it has varied geographically. As such, an analysis of the entire country may lose region-specific aspects of impacts on female sexual function. Second, we leveraged a convenience sample of women surveyed immediately prior to the pandemic who made a purchase at a cannabis dispensary which may limit generalizability. Additionally, the average overall FSFI score found in our sample is higher than the average FSFI score reported in other studies, which may additionally limit generalizability. Finally, an established limitation of the FSFI is its inability to quantify the sexual function of sexually inactive women.¹⁷ In order to address this, we only examined women who were sexually active, and thus our results may not be applicable to sexually inactive women.

Nevertheless, the present study is the first to examine female sexual function and frequency during the COVID-19 pandemic in the United States. We report an increase in female sexual dysfunction and no change in frequency of intercourse. Additionally, the development of risk for sexual dysfunction was associated with symptoms of depression and anxiety during the pandemic. Therefore, further investigation of strategies to improve both female sexual and mental health during a pandemic (e.g. in person or virtual visits with clinicians, therapists, and psychologists) may be warranted.

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Conflicts of Interest: The authors report no conflicts of interest.

Funding: None.

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Conceptualization, All Authors; Data curation, H.B., T.C., and A.K.; Formal Analysis, H.B. and T.C.; Investigation, All Authors; Methodology, All Authors; Writing – Original Draft, H.B. and T.C.; Writing – Review & Editing, All Authors; Supervision, G.W., E.E., and M.E.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.esxm.2021.100355.