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Predicting Women's Sexual Function Based on Circadian Rhythms and Anxiety Sensitivity

Amaneh Dashtestan Nejad[1], Akram Dehghani[2*], Azam Salehi[3], Mohammad Masoud Dayarian[4]

[1]PhD student in General Psychology, Department of Psychology, Najafabad Branch, Islamic Azad University, Najafabad, Iran
[*2]Assistant Professor, Department of Psychology, Najafabad Branch, Islamic Azad University, Najafabad, Iran
[3]Assistant Professor, Counseling Department, Khorasgan Branch, Payame Noor University, Khorasgan, Iran
[4]PhD in Family Counseling, Counseling Department, Khomeini Shahr Branch, Islamic Azad University, Khomeini Shahr, Iran

Corresponding Author Address: Department of Psychology, Najafabad Branch, Islamic Azad University, Najafabad, Iran

Tel: 0098-9131263604

Email: Ddehghani55@yahoo.com

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Abstract

Background: Sexual dysfunction is one of the factors causing adverse effects on marital life.
Objectives: Therefore, the present study aimed at predicting female sexual function based on circadian rhythms and anxiety sensitivity.
Methods: The present descriptive-correlational study was performed on 378 married women referring to cultural centers in Isfahan, Iran, from September 2019 to March 2020. The multistage cluster and then convenience sampling methods were used to select samples. Data collection instruments included the female sexual function index developed by Rosen et al., morningness-eveningness personality questionnaire designed by Horne and Ostberg, and anxiety sensitivity index developed by Floyd et al. The collected data were analyzed using Pearson correlation coefficient and stepwise regression with SPSS version 24.
***Results*:** The means of age and marriage years of the study participants were 32.53±7.74 and 7.09±3.76 years, respectively. The mean score of their sexual function was 56.85±12.65 and the circadian rhythm 40.84±11.57, and the overall score of anxiety sensitivity 44.99±7.19. The findings also showed that the relationship between sexual function and circadian rhythms was 0.17 and anxiety sensitivity -0.18 ($P<0.01$). The relationship between sexual function and the components of anxiety-related physical sensations, cognitive dyscontrol, and fear of publicly observable anxiety was -0.14, -0.13, and -0.11, respectively ($P<0.05$). In the first stage, anxiety sensitivity could predict 16.7% of changes in sexual function and circadian rhythms 7.1% of the mean changes in sexual function ($P<0.001$), so it can be said that anxiety sensitivity and morningness personality could predict 24% of sexual dysfunction variation ($P<0.001$).
Conclusion: The present study findings show that anxiety sensitivity and circadian rhythms are among the factors affecting sexual function; therefore, it is recommended to reduce anxiety and improve sleep quality to treat sexual disorders in married women.

Keywords: sexual dysfunction, circadian rhythms, anxiety sensitivity

Introduction

Marriage and marital bond is the main social costume shaping sexual activity in a family environment to prevent suppression outcomes [1]. The most common sexual dysfunction is erectile dysfunction in men and low libido, difficulty reaching orgasm, and pain during penetration in women, as reported in studies [2]. The research found that sexual function is influenced by biological [3], psychological [4], socio-cultural factors [5], as well as interpersonal relations [6]. However, there are variables that their effects on sexual function are not well-defined in previous research, such as circadian rhythms and personality traits of couples. Human circadian rhythms are internal processes repeated every 24 hours and guided by environmental cues, such as the light/dark cycle [7]. Studies on morningness

personality indicated that such individuals are emotionally stable, serious, trustworthy [8], dutiful, and realistic [9]. They had better performance [10] and got higher scores in persistence and cooperation [11]. Studies showed that dysregulated sleep-wake cycle [12] and depression [7] were more frequent among those with eveningness personality. Shareh and Eshaghi Sani (2018) showed in a study that having a morningness personality is associated with a greater sense of marital satisfaction [13]. Pastuszak et al., (2017) showed that lower sleep quality reduces sexual function in couples [14], and the study by Morehouse et al., (2011) indicated that circadian rhythms by making changes in the central nervous and gastrointestinal systems, as well as sexual desire, cause sleep disorders and sexual dysfunction [15].

Anxiety sensitivity is one of the cognitive constructs that can be associated with psychiatric disorders such as sexual dysfunction [16]. It reflects the interpretation of physical, psychological, and social consequences of anxiety experiences, such as distressing and dangerous [17]. The concept of anxiety sensitivity refers to the fears of anxiety-related physical sensations, interpreted as a process that has detrimental physical, psychological, or social consequences [18]. To the best of the authors' knowledge, anxiety sensitivity is high in those with psychiatric disorders and can be considered a predictor of functional problems [19]. The findings of a study indicate that individuals with anxiety disorders have poor sexual performance [20]. The study by Sharifian et al., (2015) showed that anxiety intensifies the symptoms of sexual dysfunction [21], and research by Najarpourian and Samavi (2018) indicated that anxiety sensitivity reduces sexual function [22].

Given the above and the role of sexual function in marital satisfaction and adjustment [23] and other aspects of personal and social life, it can be said that this disorder is common among women of all ages, and its adverse effects affect their quality of life and sexual function as well as the quality of life of their husbands. It, in turn, affects the health of the whole family and society and encourages specialists and researchers to identify the underlying factors and provide treatment methods. Given the incomplete and irrelevant results of the mentioned studies, as well as the focus of research on stress and not anxiety sensitivity, it seemed essential to perform research on the effect of circadian rhythms and anxiety sensitivity on women's sexual function. Therefore, according to the above and scarcity of research on the effect of circadian rhythms and anxiety sensitivity on women's sexual function, the present study aimed at predicting sexual function based on the variables of circadian rhythms and anxiety sensitivity.

Methods

The present descriptive-correlational study was conducted on married women referring to cultural centers in Isfahan, as the statistical population, from September 2019 to March 2020. Given the large size of the research population, the three-stage cluster sampling method was used. For this purpose, first, all cultural centers in 15 municipal districts of Isfahan were identified, of which two districts were randomly selected, and two cultural centers were chosen randomly from each. Then programs and courses, which their participants met the inclusion criteria of being the residence of one of 15 municipal districts of Isfahan, not having acute mental and physical conditions, having at least guidance school education, age 25-40 years, and cohabitation with the spouse, as well as the exclusion criteria of the incomplete questionnaire, were determined. After explaining the study objectives and inclusion/exclusion criteria, and obtaining written consent for participation in the research, the participants were selected by the convenience sampling method through interviews in order to enroll eligible subjects.

The initial sample size was determined 384, based on Cochran's formula for infinite populations at an error level of 0.05, but concerning dropouts, a total of 400 questionnaires were distributed. Questionnaires with more than 10 unfilled items were excluded from analysis, and finally, 378 questionnaires were analyzed.

The female sexual function index: This 19-item instrument was developed by Rosen (2000) in six domains of desire, arousal, lubrication, orgasm, satisfaction, and pain. Each item in the desire domain is scored from 1 to 5, and in arousal, lubrication, orgasm, sexual satisfaction, and pain from 0 to 5. The overall score is calculated by summing up the scores of items in each domain

and then multiplying in the coefficient of each domain as 0.6 for desire, 0.3 arousal, 0.3 lubrication, 0.3 orgasm, 0.4 sexual satisfaction, and 0.4 pain. The total scores in the desire domain range from 1.2 to 6 and in the rest from 0 to 6. A higher score indicates higher sexual performance. The cutoff point for desire is 1.2, arousal 2.8, lubrication 2.8, orgasm 2.6, sexual satisfaction 3, and pain 3, and for the overall score of the index 28. Studies by Isidori et al., showed that this scale has good internal consistency (0.78) and test-retest reliability (0.95) and can significantly distinguish women with sexual dysfunction from those with normal performance [24]. Mohammadi et al., (2008) in Iran also reported the reliability of desire, arousal, lubrication, orgasm, sexual satisfaction, and pain using Cronbach's coefficient as 0.70, 0.90, 91.90, 0.76, and 0.88, respectively. They also reported the reliability of the whole scale as 0.92 [25]. In the present study, the reliability of the scale was 0.96 by Cronbach's alpha coefficient and 0.92 by the split-half method.

Morningness-eveningness personality questionnaire designed by Horne and Ostberg: This 19-item instrument measures sleeping and waking habits, preferred times for physical and mental activities, as well as subjective alertness [26]. The given scores from lower to higher are referred to as completely morningness, rather morningness, completely eveningness, and rather eveningness, respectively [27]. The scale was translated into Persian by Ziaee et al., and after a pilot study was applied to the study population. The alpha of the whole scale was 0.77 in their study, indicating high reliability [28]. The reliability obtained for this scale in the present study was 0.73 by Cronbach's alpha coefficient and 0.78 by the split-half method.

Anxiety sensitivity index (ASI) developed by Floyd: This instrument has 16 items and three dimensions, including fear of anxiety-related physical sensations, fear of cognitive dyscontrol, and fear of publicly observable anxiety; each item is scored based on a five-point Likert scale from 0 to 4. Each item reflects the belief that anxious feelings are perceived unpleasantly and capable of traumatic outcomes. Higher scores indicate increased fear of anxiety symptoms. Scores range from 0 to 64. This questionnaire consists of three dimensions as fear of anxiety-related physical sensations (eight items), fear of cognitive dyscontrol (four items), and fear of publicly observable anxiety (four items) [29]. Assessment of psychometric properties of ASI showed its good internal consistency (alpha: 0.80-0.90). The test-retest reliability for two-week and three-year intervals was 75% and 71%, respectively, indicated that anxiety sensitivity is a stable personality trait [29]. The validity of ASI in an Iranian population was assessed by three methods of internal consistency, test-retest, and split-half, through which the validity coefficients of 0.93, 0.95, and 0.97, respectively, were measured for whole the scale [30]. Concurrent validity was assessed by simultaneous implementation of ASI and SCL-90 questionnaire through which the correlation coefficient was 0.56. The total score correlation coefficients were satisfactory, ranging from 0.74 to 0.88. The intraclass correlation coefficients also ranged from 0.40 to 0.68 [30]. The study by Keshavarz and Khalatbari (2018) reported the reliability of the instrument by Cronbach's alpha coefficient as 0.88 [31]. In the present study, the validity of the instrument measured by Cronbach's alpha coefficient was 0.79, while 0.72, 0.77, and 0.77 for fear of anxiety-related physical sensations, fear of cognitive dyscontrol, and fear of publicly observable anxiety subscales, respectively.

Results

Analysis of the data obtained from 378 completed questionnaires showed that the mean±standard deviation (SD) age of the subjects was 32.53±7.74 years and the mean marriage years 7.10±3.76. In addition, 35.1% of the participants had a high school diploma and lower, 51.4% associate degree and bachelor, and the remaining 13.4% higher educations.

The study results shown in Table 1 indicated the normal distribution of all variable scores and a significant relationship between sexual function and circadian rhythms, anxiety sensitivity, and its domains. The findings showed a positive correlation between sexual function and circadian rhythms as 0.17 and a negative correlation with the overall ASI score, as -0.18. Therefore, with increasing circadian rhythm scores, women's sexual performance improved, and with increasing ASI scores, their sexual performance was hindered ($P<0.01$). The study findings also

showed a relationship between sexual function and fear of anxiety-related physical sensations, fear of cognitive dyscontrol, and fear of publicly observable anxiety subscales as 0.14, -0.13, and -0.11, respectively (P<0.05).

Table 1: Evaluation of Descriptive and Normality of Data and the Correlation Matrix of the Study Variables

	Mean	**SD**	**Normality by Smirnov-Kolmogorov Test**	**Sexual Function**	**Circadian Rhythm**	**Fear of Anxiety-related Physical Sensations**	**fear of Cognitive Dyscontrol**	**Fear of Publicly Observable Anxiety**	**Anxiety Sensitivity**
Sexual function	56.850	12.650	0.079	1					
Circadian rhythm	40.842	11.566	0.211	0.168**	1				
Fear of anxiety-related physical sensations	22.729	4.54	0.086	-0.135**	-0.082	1			
fear of cognitive dyscontrol	11.207	2.745	0.067	-0.130*	0.024	0.209**	1		
Fear of publicly observable anxiety	11.054	2.704	0.103	-0.110*	0.021	0.180**	0.447**	1	
Anxiety sensitivity	44.989	7.189	0.115	-0.176**	-0.050	0.779**	0.660**	0.660**	1
Age	32.53	7.74	0.118	0/205	0.03	0.016	0.059	0.001	0.032
Marriage years	7.10	3.76	0.093	0.051	-0.046	0.008	-0.004	-0.024	-0.006
Level of education	--	--	--	0.014	0.035	-0.07	0.014	0.051	-0.022

(*p<0/05 , p<0/01)**

According to Table 2, in the first step, the anxiety sensitivity variable was entered into the regression equation due to having the highest correlation coefficient with the dependent variable and explained 17% of the variance of the sexual function variable, which was significant at a P-value of 0.01, considering the F-value of 12.348. In the second step, circadian rhythms were entered into the equation due to having the highest correlation coefficient with anxiety sensitivity that could explain 24% of sexual function, which was significant at a P-value of 0.01 considering the F-value of 10.289.

Table 2: Regression Analysis for Examining the Multiple Relationships Between Predictive Variables and Criterion Variable of Sexual Function

Stage	Variable Entered into the Equation	Effect Size	R^2	Standard Error	Statistical Changes				
					Adjusted Coefficient of Determination	n-1 Degree of Freedom	n-2 Degree of Freedom	f	P-value
1	Anxiety sensitivity	0.167	0.031	12.468	0.031	1	385	12.347	0.001
2	Circadian rhythms	0.238	0.056	12.320	0.025	1	384	10.289	0.001

According to Table 3, among the predictive variables, anxiety sensitivity (t:-3.39) and circadian rhythms (t:-3.21) could predict changes in the average sexual function. Therefore, with a non-standard coefficient of -0.30 for anxiety sensitivity and 0.170 for circadian rhythms, an increase in anxiety sensitivity in the research subjects decreased their average sexual function, and an increase in the circadian rhythm scores increased their average sexual function (P<0.01). In other words, according to the obtained standard beta coefficients, by increasing the anxiety sensitivity of the subjects for 1 SD, their average sexual function decreased by 0.17 SD, and by increasing the average score of circadian rhythms for 1 SD, their average sexual function increased by 0.16 SD. Other findings showed no significant relationship between age, marriage years, level of education, and sexual function; therefore, it did not enter the regression equation.

Table 3: Results of Regression Coefficient Between Predictive Variables and the Criterion Variable of Sexual Function

	Non-standard Coefficient		Standard Coefficient		P value
	β	Standard deviation	β	t	
Constant	63.075	4.650		13.564	0.001
Anxiety sensitivity	-0.296	0.087	-0.168	-3.394	0.001
Circadian rhythms	0.174	0.054	0.159	3.208	0.001

Discussion

Findings showed that circadian rhythms and anxiety sensitivity were correlated with female sexual function and could be predicted. Likewise, by increasing the anxiety sensitivity, the sexual performance of the subjects decreased and vice versa. These findings were in line with those of the studies by Sharifian et al. [21], Najarpourian and Samavi [22], and Seehuus and Pigeon, showing that couples with eveningness personality had good sexual performance [32]. For explaining this finding, when both partners have the same circadian rhythm, they can have more sex due to the same sleep-wake time, which can have a positive effect on their sexual performance. Other findings also showed that due to gender adjustment, anxiety sensitivity could not predict sexual function in men [33]; therefore, gender differences can be the reason for inconsistency between the present study results and those of the above researches.

To explain the present study findings, the evidence of research on sexual function and related disorders suggests that cognitions, beliefs, and thoughts can affect the type of sexual activity that the individual engages in and strongly affect her sexual response in terms of desire, arousal, and orgasm [34]. Anxiety sensitivity is a cognitive style of fear that stress is one of its symptoms [35]. Individuals with higher ASI scores believe that anxiety sensitivity has adverse and catastrophic outcomes, including physical and mental illnesses, loss of control, and embarrassment [36]. The results of factor analysis showed that anxiety sensitivity is a multidimensional structure that includes three subscales of fear of anxiety-related physical sensations, fear of cognitive dyscontrol, and fear of publicly observable anxiety [35]. Therefore, anxiety sensitivity can be considered a risk factor for axis I disorders [37].

According to the cognitive theory of adaptive control of thought, people feel that they do not have enough control over their disturbing thoughts, so overestimating the possibility of threats or negative impact of events and overemphasizing their thoughts [36]; hence, they experience mental disturbances, including sexual dysfunction. It seems that anxiety sensitivity is associated with sexual dysfunction symptoms through fear of cognitive dyscontrol. On the other hand, some people with sexual dysfunction may be afraid of anxiety-related physical sensations [35]. Various studies showed a relationship between fear of physical sensation and sexual dysfunction [38]. Such individuals are attentive to their physical sensations, pay excessive attention to them, and consider them as a sign of sexual dysfunction, in turn, lowering their sexual performance.

Other findings of the present study showed that circadian rhythms could predict female sexual function and those with morningness personality had better sexual performance; these findings were consistent with those of the studies by Shareh and Eshaghi-sani [13], Pastuszak et al. [14], and Morehouse et al. [15]. For explaining the effect of circadian rhythms, researches on this issue showed that individuals with morningness personality have a healthier lifestyle and are emotionally stable, serious, and trustworthy. In contrast, those with eveningness personalities are more prone to behavioral disorders [39]. The results of researches showed that eveningness personality has a significant relationship with over problematic drug use, addiction to non-narcotic drugs, addiction to cannabis, and mental disorders [40]. Wakefulness is associated with less beneficial mood, particularly less stability. Wakefulness reduces pleasure and energy and increases stress [41]. Therefore, considering that sexual function is influenced by mental health, energy, and lack of stress and tension during intercourse, promoting morningness traits improves sexual performance.

Conclusion

The findings of the present study showed that anxiety sensitivity and circadian rhythms can predict the level of sexual function. Thus, by increasing anxiety sensitivity, the sexual function of married women in Isfahan decreases, and by increasing their ASI scores and promoting morningness personality traits, their sexual performance improves. Therefore, for improving sexual function, concentration on personality traits, circadian rhythms, and anxiety sensitivity might be helpful. Regarding the study limitations, the lack of selecting sampling clusters in Isfahan districts based on socioeconomic and cultural features is noteworthy. Therefore, it is suggested to select samples according to socioeconomic features of the regions and then randomly from each cluster in future studies.

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Conflict of interest

The authors declared no conflicts of interest.

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