Received: 06/13/2024 **Accepted:** 10/20/2024

Open Access

Doi.org/10.30473/ijohp.2025.72453.1377

Vol.7, No.4, Serial Number 22, p.63-76, Autumn 2024

Iranian Journal of Health Psychology

Research Article

Structural Model of Women with Endometriosis Based on Sexual Function, Psychosocial Health, and Life Satisfaction Mediating by Cognitive Emotion Regulation

Behnaz Navid[1], Ahmad Alipour[2], Eisa Jafari[3], Ashraf Moini[4, 5, 6]

1.Department of Psychology, Payame Noor University, Tehran, Iran
2.Department of Psychology, Payame Noor University, Tehran, Iran
3.Department of Psychology, Payame Noor University, Tehran, Iran
4.Department of Endocrinology and Female Infertility, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran
5.Department of Gynecology and Obstetrics, Arash Women's Hospital, Tehran, University of Medical Sciences, Tehran, Iran
6.Breast Disease Research Center (BDRC), Tehran University of Medical Sciences, Tehran, Iran

Correspondence:

Ahmad Alipour

Email:

alipor@pnu.ac.ir

How to Cite

navid, B. , Alipour, A. , jafari, E. and moini, A. (2024). Structural Model of Women with Endometriosis Based on Sexual Function, Psychosocial Health, and Life Satisfaction Mediating by Cognitive Emotion Regulation. Iranian Journal of Health Psychology, 7(4), 63 -76. doi:10.30473/ijohp.2025.72453.1377

Abstract

Objective: This study was conducted to examine the structural model describing the connection between sexual function and psychosocial factors with life satisfaction based on the mediator role of cognitive emotion regulation in women with endometriosis.

Method: This present study was a descriptive correlational research based on structural equations. The statistical population of the study included all women with endometriosis, referring to Arash Hospital as a referral Women's Center and Gynecological office in Tehran, Iran, in 2023-2024. According to Morgan's formula, a sample of 357 participants was chosen through convenience sampling. The tools employed in this study for data collection were the Women's Sexual Function Index (Isidori et al., 2010), Short Form Symptom Checklist-25-Revised (Derogatis et al., 1973), Social Health Questionnaire (Keyes, 2004), Emotion Regulation Questionnaire (Garnefski & Kraaij, 2006), and Satisfaction with Life Scale (Diner, 1985). Data analysis was done using Structural Equation Modeling (SEM) and path analysis, and AMOS22 software was utilized to assess the proposed model, and the mediating relationships within it were also calculated using the bootstrap method.

Results

The findings from structural equation modeling supported the model's goodness of fit and indicated that psychological factors negatively affect life satisfaction through the mediating role of cognitive emotion regulation in women with endometriosis (β= -0.114, $p<0.001$). In addition, the relationship between biological and social factors and life satisfaction through the mediating variable was not found to be significant. Nevertheless, the overall effect of psychological, social, and biological factors (including the sum of direct and indirect pathways) in connection with life satisfaction was significant ($p<0.001$).

Conclusion: According to the findings, the model has a good fit, and cognitive emotion regulation has a mediating role in the relationship between sexual function and psychosocial factors with life satisfaction. This study offers a valuable framework for recognizing key factors influencing life satisfaction in women with endometriosis, which should be taken into account in psychological treatment programs.

Keywords: Sexual Function, Psychosocial Health, Cognitive Emotional Regulation, Life Satisfaction, Endometriosis.

©2024 by the authors. Lisensee PNU, Tehran, Iran. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International (CC BY4.0) (http:/creativecommons.org/licenses/by/4.0)

Extended Abstract

Background and Objective

Endometriosis is a chronic inflammatory gynecological disorder affecting 10–15% of reproductive-age women, leading to chronic pelvic pain, infertility, and psychological distress. Up to 80% of affected individuals experience persistent pain, 30–50% struggle with infertility, and nearly 50% report mood disorders like depression and anxiety. Beyond physical symptoms, endometriosis significantly impacts quality of life, emotional well-being, and interpersonal relationships. Many patients face emotional distress due to inadequate coping strategies and a lack of understanding of the condition. Sexual function plays a crucial role in overall well-being and life satisfaction, while cognitive emotion regulation helps manage chronic stress and pain. Effective cognitive coping strategies enhance emotional resilience and quality of life. However, research on the relationship between sexual function, psychosocial factors, and life satisfaction in endometriosis, particularly the mediating role of cognitive emotion regulation, remains limited. This study employs structural equation modeling (SEM) to explore how sexual function and psychosocial factors influence life satisfaction through cognitive emotion regulation. By examining these relationships, the research aims to provide deeper insights into the psychological dimensions of endometriosis, contributing to improved clinical awareness and disease management strategies.

Material and Methods

This study employs a descriptive-correlational design utilizing structural equation modeling (SEM) to examine the relationships between sexual function, psychosocial factors, and life satisfaction, with cognitive emotion regulation as a mediating variable in women with endometriosis. The statistical population comprises patients referred to ARASH Hospital and gynecological clinics in Tehran, Iran. Data collection occurred between the second half of 2023 and the first half of 2024, with a final sample of 357 participants selected through a convenience sampling method. Data analysis was conducted using SPSS (version 22.0) and AMOS (version 22), applying Pearson correlation and path analysis. Measures included the Female Sexual Function Index (FSFI-6), Short Form Symptom Checklist-25-Revised (SCL-25), Social Health Questionnaire (SHQ-20), Cognitive Emotion Regulation Questionnaire (CERQ-18), and the Satisfaction with Life Scale (SWLS-5). Ethical considerations were strictly observed, with informed consent obtained from all participants. Confidentiality and voluntary participation were ensured, and the study received ethical approval from the Payame Noor University Ethics Committee (IR.PNU.REC.1402.408). Findings from this study will provide insights into the psychosocial dimensions of endometriosis, highlighting the role of cognitive emotion regulation in mediating the relationship between sexual function and life satisfaction. These results may contribute to the development of targeted interventions aimed at improving psychological well-being and quality of life in affected individuals

Results

A total of 357 women with endometriosis participated in this study, with an age range of 36.5–43 years and a BMI of 25.02–29.73. The majority (79.6%) was married, and the mean duration of endometriosis was 3.64 ± 3.31 years. Severe menstrual pain was reported by 20.7%, while 39.9% experienced severe pain during intercourse. Additionally, 40.1% of participants had infertility, with average infertility duration of 7.43 ± 4.74 years. The results demonstrated significant relationships between the measured variables. The Female Sexual Function Index (FSFI) negatively correlated with psychological distress (SCL) and social well-being (Keyes and SWLS). SCL had a negative correlation with Keyes and SWLS but a positive correlation with cognitive emotion regulation (CERQ). SEM results confirmed a good model fit (χ^2/df = 3.081, GFI = 0.971, CFI = 0.966, RMSEA = 0.076). Psychological, social, and biological factors were identified as predictors of life satisfaction, with cognitive emotion regulation strategies mediating their effects. Psychological factors negatively influenced life satisfaction through maladaptive emotion regulation strategies (P = 0.001, β = -0.114), while social and biological factors had no significant indirect effect. However, the overall impact of psychological, social, and biological factors on life satisfaction was significant. Bootstrap testing confirmed the validity of indirect pathways. These findings highlight the critical role of cognitive emotion regulation in understanding the psychological burden of endometriosis and its impact on life satisfaction.

Discussion and Conclusion

This study aimed to develop a structural model to examine the relationship between sexual function and psychosocial factors with life satisfaction in women with endometriosis, mediated by cognitive emotion regulation strategies. To the best of our knowledge, this is the first study to evaluate these relationships using FSFI-6, SCL-25, Social Health Keyes-20,

CERQ-18, and SWLS-5. The findings support the study hypothesis, showing that both female sexual function and social health significantly and positively impact life satisfaction, consistent with previous research. Psychological distress (SCL) was negatively correlated with social health and life satisfaction, highlighting the detrimental effects of psychological disorders on overall well-being. Maladaptive cognitive emotion regulation strategies were negatively associated with life satisfaction, whereas adaptive strategies contributed to better life satisfaction. The connection between maladaptive strategies and psychological disorders was significant, indicating that ineffective coping mechanisms exacerbate mental health issues. Additionally, the study revealed a significant negative relationship between psychological distress and sexual function, reinforcing prior findings that depression and anxiety impair quality of life and interpersonal relationships. Contrary to expectations, infertile women reported higher sexual function scores than those without infertility. However, no significant differences were observed between fertile and infertile women regarding psychological disorders, social health, and life satisfaction. This aligns with previous research suggesting that infertility alone is not a determinant of depressive symptoms in women with endometriosis. Structural equation modeling indicated that psychological factors indirectly and significantly influenced life satisfaction through cognitive emotion regulation strategies. However, the indirect relationship between social and biological factors and life satisfaction through emotion regulation was not significant. The study faced several limitations, including the use of a non-random sample from Tehran, lack of control over personal variables, absence of an objective pain measurement tool, and reliance on self-report questionnaires, which may introduce bias. Future research should focus on intervention strategies that enhance adaptive emotion regulation skills to improve life satisfaction in women with endometriosis.

According to the findings, the present study provides a useful framework for identifying the influential components in the field of life satisfaction in women with endometriosis that should be considered in psychological treatment programs.

Introduction

Endometriosis is physiologically defined as an inflammatory and gynecological chronic disease, affecting approximately 10% to 15% of all childbearing-aged women (Aerts et al., 2018; Rogers et al., 2009). Endometriosis is commonly characterized by pelvic pain, infertility, and mental health problems (Divasta et al., 2018; Dunselman et al., 2014). Chronic pain has been reported in nearly 80% of cases, 30-50% from infertility, and 20-25% are asymptomatic (Vercellini et al., 2014), as well as up to 50% of women with endometriosis suffer from mood disorders (Missmer et al., 2022). Lagana et al. (2016) indicated an association between psychiatric disorders such as depression, somatization, psychological stress, and anxiety with chronic pain among endometriosis patients (Lagana et al., 2016). Indeed, infertility and chronic pain are risk factors for psychological problems that severely affect mental health and quality of life in women with endometriosis (Facchin et al., 2017; Shahraki et al., 2018; Pope et al., 2015).

Today, researchers have focused significantly on the impact of proper sexual function on quality of life and life satisfaction, recognizing it as a crucial aspect of sexual health (Bernays et al., 2020; Kołtuniuk et al., 2020; Cozzolino et al., 2018). Endometriosis is a serious health condition that interferes with daily life, academic pursuits, career development, sexual well-being, and social activities (Culley et al., 2013; Roomaney & Kagee, 2018) that can result in the emergence of severe emotional challenges and may lead to lasting effects on mental health (Brosens, Gordts & Benagiano, 2013). Moreover, women with endometriosis indicate high levels of struggle to manage the illness, which results in heightened emotional distress, including frustration, anger, and depression due to the limited understanding and awareness surrounding the condition (Cavaggioni et al., 2014). Using cognitive appraisal and coping strategies is necessary to consider how a person responds to chronic stressful situations, such as adapting to sickness or long-term pain. Berking and Lukas (2015) indicated that cognitive coping methods may serve as a potential strategy for addressing psychopathological

symptoms. However, no studies have explored whether the association between specific cognitive emotion regulation strategies and psychopathology remains consistent across cultural or national contexts. Also, emotion regulation affects life satisfaction (Steger et al., 2006; Shahpanah et al., 2022), suggesting that emotion regulation has a vital effect on life satisfaction.

Evidence shows strategies contribute significantly to the psychosocial health of adult women with chronic illnesses, facilitating the transformation of maladaptive pain beliefs, enhancing self-esteem, adopting more effective coping approaches, and improving quality of life (Mills et al., 2019). Previous research highlights the role of pain severity on sexual function and psychosocial factors in women with endometriosis; however, the research is lacking in terms of understanding the relationship between sexual and psychosocial factors with life satisfaction in endometriosis based on considering cognitive emotion regulation in endometriosis. According to endometriosis, a chronic, multifactorial, and highly prevalent disease, obtaining further insights into its relationship may help to improve health provider awareness, optimize disease management, and facilitate personalized, interdisciplinary treatment and care. Background studies have also explored the psychological factors involved in chronic disease; however, the evidence base for endometriosis is still limited, and there is a lack of sufficient research in this area. Therefore, the present study aimed to use structural equation modeling to examine the connection between sexual function and psychosocial factors with life satisfaction by the mediation of cognitive emotion regulation in women with endometriosis. Additionally, it tests the model's structure to determine if it fits adequately and whether cognitive emotion strategies can mediate the connection between sexual factors, psychosocial factors, and life satisfaction. Figure 1 demonstrates the theoretical model of the study.

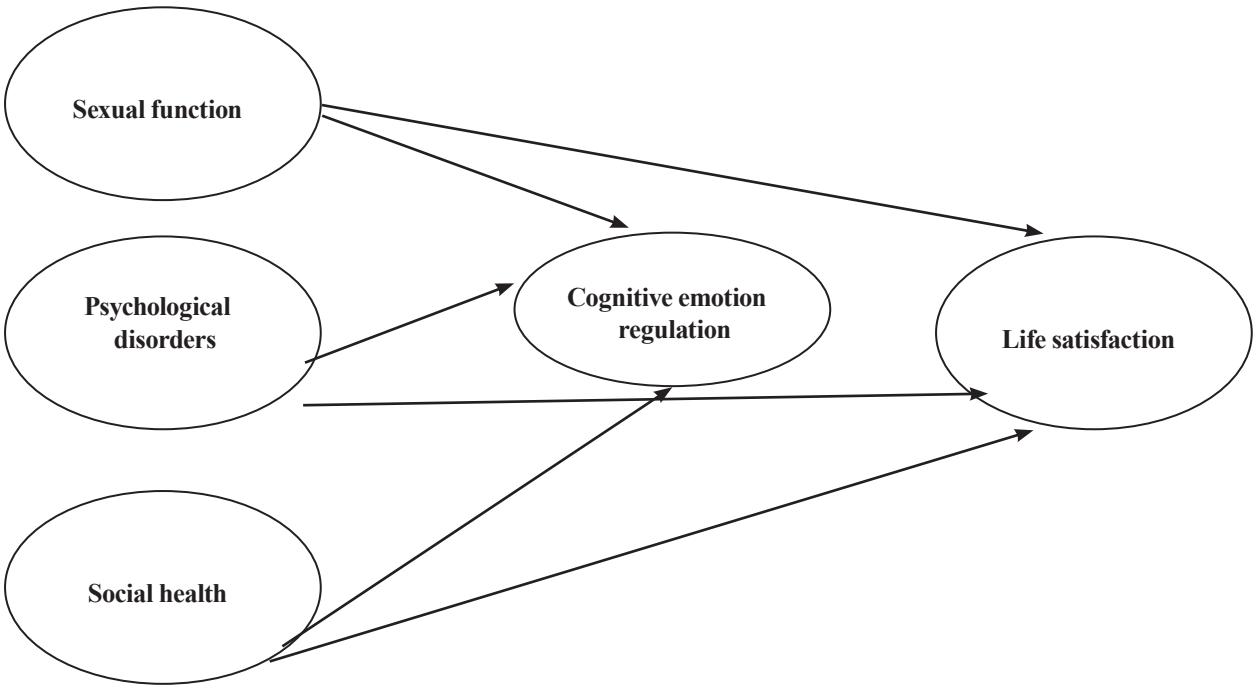

Figure 1: Research theoretical model

Method

Participants and Procedure

This study employed a descriptive-correlational design and was categorized as applied research based on its objectives. Structural equation modeling (SEM) was used for data analysis through path analysis in AMOS software. The statistical population consisted of all women with endometriosis referring to ARASH hospital and the gynecological office in Tehran, Iran. The data were collected between the second half of 2023 and the first half of 2024. According to Kline (2016), a minimum of 200 participants is required for structural equation modeling, with a recommended ratio of 5 to 10 participants per estimated parameter being analyzed. According to Morgan's sample size table, a total of 370 participants were selected through the convenience sampling method, and after removing incomplete data, the data from 357 respondents were analyzed. The inclusion criteria for the present study were women with endometriosis disease, the ability to read and write in Persian, having no severe psychological disorder, and not using medication for mental health issues. Exclusion criteria included having no cancer, autoimmune diseases, skin diseases, and allergic diseases. Also, participants who were unwilling to continue or experienced significant physical or mental health complications were excluded.

Ethical Statement

All ethical protocols were considered in this study. Informed consent forms were given to the participants, and all necessary information, including the aims, confidentiality, and non-disclosure of participants' information, was provided to them. It was explained that if clients were reluctant to continue, they could stop taking part in the study at any time. It was also explained that after the end of the study, the results would be revealed to them if participants wanted. The research protocol was approved by the Ethics Committee of Payame Noor University, Tehran, Iran (IR.PNU.REC.1402.408).

Data Analysis

The data were subjected to descriptive statistics (e.g., mean, standard deviation) and inferential methods. Given the research objectives and hypotheses, Pearson correlation analysis and structural equation modeling were conducted. SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) and AMOS 22.0 were used for data analysis.

Measures

Demographic Questionnaire includes age, body mass index (BMI), level of education, occupation, marriage status, menstrual pain severity, intercourse pain severity, and infertility.

Female Sexual Function Index (FSFI-6): The Female Sexual Function- short form was developed by Isidori et al. (2010), evaluating sexual function in women. Six items are derived from the original 19 items.It includes six separate domains, namely desire, arousal, lubrication, orgasm, satisfaction, and pain.

Items related to desire and satisfaction are rated on a 5-point Likert scale (ranging from 1 to 5), while the remaining items are scored on a 6-point Likert scale (ranging from 0 to 5). The total score ranges from 2 to 30, with lower scores indicating poorer sexual functioning. The internal consistency of the scale was evaluated by Cronbach's alpha = 0.86. Moreover, according to Maroufizadeh et al. (2019), this scale has

demonstrated strong reliability and validity in clinical populations in Iran. The internal consistency of the FSFI-6 was high (Cronbach's alpha = 0.856). Its brevity and comprehensiveness allow a quick assessment in clinical and research settings.

Short Form Symptom Checklist-25-Revised (SCL-25): Symptom Checklist 90 (SCL-90) was developed by Derogatis et al. (1973). This questionnaire is a short form of the original SCL-90 extracted and validated in Iran by Najarian and Davoodi (2001). It evaluates nine psychological dimensions: somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, paranoid ideation, phobic anxiety, and psychoticism. In addition, some items are not associated with a specific subscale but contribute to the overall score. Responses to this list are provided according to its original format on a 5-point scale ranging from "none or rarely" (0), "a little" (1), "somewhat" (2), "a lot" (3), to "very much or extremely" (4). A total score indicating general psychological distress is derived from this list, with higher scores indicating higher distress. For the new version, they stated Cronbach's α as 0.97 for women and 0.98 for men, with test-retest coefficients after a 5-week interval being 0.78 for women and 0.79 for men across the entire sample.

Social Health Questionnaire (SHQ-20):The Social Health Questionnaire (SHQ), developed in the Macarthur Science Foundation (USA) by Keyes and Shapiro (2004), is a crucial tool designed to assess individuals' social health and well-being. This questionnaire consists of 20 items, each aiming to measure various dimensions of social health, including (social actualization, social coherence, social integration, social acceptance, and social contribution) that are rated on a 5-point Likert scale, ranging from 1(strongly disagree) to 5 (strongly agree). A total score could be 100, with higher scores indicating better social health, while lower scores suggest areas needing improvement. The SHQ has demonstrated strong internal consistency, with Cronbach's alpha of 0.7.

Cognitive Emotion Regulation Questionnaire (CERQ-18): Garnefski et al. (2006) developed a Cognitive Emotion Regulation Questionnaire to measure the cognitive components of emotion regulation. It was constructed to identify coping strategies that refer to the individual's thoughts after experiencing a negative situation. The Short Version (CERQ) is a self-report, multidimensional instrument that includes 18 items and nine subscales: self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing, and other-blame. Each subscale can yield a score ranging from 2 to 10. A higher score on each subscale indicates a higher presence of that specific cognitive coping strategy. The reliability of this questionnaire was 0.85 (at the interval of 0.71-0.81 for each subscale) based on Cronbach's alpha.

Life Satisfaction Questionnaire (SWLS-5): SWLS was used to assess life satisfaction. This scale was developed by Diner et al. (1985) and included five questions. The answers were based on the Likert Scale (1: strongly disagree, 2: disagree, 3: no idea, 4: agree, 5: strongly agree). The scores of 5-10 showed poor life satisfaction, 10-15 indicated moderate life satisfaction, and scores above 15 indicated high life satisfaction. The reliability of this scale through Cronbach's α = 0.80. In Iran, validity and reliability were reported at α = 0.83 (Montanari et al., 2013).

Results

Descriptive and Clinical data (mean and standard deviation) of research variables are presented in Table 1.

Table 1: Descriptive and Clinical Characteristics of the study population

Variables		Mean ± SD or N (%)
	Age	36.59 6.54 ±
	BMI	25.02 4.71 ±
Education	Under diploma	29 (8.1)
	Diploma	91(25.5)
	University	218(61.1)
Occupation	Employee	176(49.3)
	Housewife	174(48.7)
Marriage status	Single	73 (20.4)
	Married	284 (79.6)
Duration of Endometriosis(year)		3.64 ± 3.31
Intensity of pain in the period	Severe	74(20.7)
	Moderate	173(48.5)
	Mild	105(29.4)
Intensity of pain in intercourse	Severe	139(39.9)
	Moderate	106(29.7)
	Mild	32(9)
Infertility	Yes	143(40.1)
	No	92(25.8)
Duration of Infertility(year)		7.43 ± 4.74

Data indicated as: Mean ±SD or N (%); SD: Standard Deviation. N: count.

In total, 357 women completed the questionnaires. They were aged 36.5- 43 years, BMI score 25.02 – 29.73. In this study, 284 (79/6%) women were married, the duration of endometriosis was 3.64 ± 3.31 years (mean ± standard error), and 74 (20.7%) women experienced severe pain in menstrual time, and 139(39.9) self-reported severe pain in intercourse time. 143 (40.1%) women had infertility, and the duration of infertility was 7.43 ± 4.74 years.

The average scores of the questionnaires indicated in Table 2.

Table 2: information of variables in women with endometriosis

Variable		Mean ± SD
	FSFI	19.68 4.85 ±
	SCL	27.35 13.28 ±
Keyes	Actualization	13.85 2.65 ±
	Coherence	8.85 2.12 ±
	Integration	11.8 2.41 ±
	Acceptance	14.05 2.38 ±
	contribution	16.74 2.77 ±
	Total	64.67 8.01 ±

CERQ	Self-blame	4.80 2.23±
	Other- blame	4.562.29 ±
	Rumination	6.46 1.93±
	Catastrophizing	4.882.13 ±
	Putting into perspective	6.431.90 ±
	Positive refocusing	5.452.27 ±
	Positive reappraisal	6.792.14 ±
	Acceptance	6.421.98 ±
	Refocus on planning	6.852.20 ±
	Adaptive	3.19 0.79 ±
	Maladaptive	2.59 0.74 ±
	Total	52.68 11.68 ±
	SWLS	23.03 6.44 ±

SD: Standard Deviation.

The correlation between variables are showen in Table 3.

Table 3: correlation between variables in study

Variable	FSFI	SCL	Keyes	CERQ	Adoptive	Mal-adoptive	SWLS
FSFI	1						
SCL	-0.198*	1					
Keyes	0.325*	-0.275*	1				
CERQ	0.049	0.359*	0.159*	1			
Adaptive	0.089	0.095	0.276*	0.032	1		
Maladaptive	-0.137*	0.522*	-0.045	0.041	-0.062	1	
SWLS	0.337*	-0.351*	0.202*	-0.188*	-0.028	-0.310*	1

Data indicated as: Coefficient correlation, *: P= <0.05.

In Table 3, data showed the relationship between the questionnaire factors. FSFI has a significant negative correlation with SCL, and there is a significant negative correlation with Keyes and SWLS. Also, SCL factors have a significant reverse correlation with Keys and SWLS and a significant positive correlation with CERQ. Keys had a significant direct correlation with CERQ and SWLS. Additionally, CERQ has a significant negative correlation with SWLS.

As shown in Table 4, the model demonstrates acceptable fit indices.

Table 4: Fitness index of the final structural model

Fitness index		RMSEA	GFI	CFI	IFI	PGFI	PNFI
Acceptance domain	<5	<0.08	>0.9	>0.9	>0.9	<0.5	<0.5
First model	5.56	0.113	0.931	0.899	0.901	0.423	0.490
Modify model	3.081	0.076	0.971	0.966	0.966	0.345	0.423

Data indicated as: Coefficient correlation, *: P= <0.05.

The results indicate that all indicators fall within the acceptable range, and the values of these indicators demonstrate that the final research model exhibits a good fit (chi-square indices/degree of freedom 2/

df = 3.081, GFI= 0.971, CFI=0.966, IFI=0.966, PGFI=0.345, PNFI= 0.423 and RMSEA=0.076). The structural model includes the predictor factors of biological, psychological, social, and cognitive emotion regulation strategies as mediating variables, with life satisfaction as the dependent variable. Fit indices for the initial and modified model are presented in Table 4. A two-step approach was used for data analysis; in the first step, confirmatory factor analysis (CFA) was employed to evaluate the measurement model. Items with a factor loading that was greater than 0.5 were included in the final model. The model was adjusted considering modification indices, particularly the correlation between measurement errors e3 and e1 and between e5 and e6. In the second step, cognitive emotion regulation strategies were considered as mediating variables in two factors: adaptive and maladaptive strategies. SEM results indicated a good fit of the proposed model with the data.

The analysis of direct pathways indicated in Table 5.

Table 5: direct and indirect pathways

Pathway(direct and indirect)		β Coefficient	Standard deviation	P value
			0.064	0.001
Sexual functioning	Direct	0.282		
	Indirect	0.012	0.013	0.338
	Direct	-0.211	0.059	0.001
Psychological disorders				
	Indirect	-0.114	0.034	0.001
		0.208	0.058	0.001
Social health	Direct			
	Indirect	-0.002	0.20	0.913
Adaptive strategies	Direct	0.211	0.050	0.027
Maladaptive strategies	Direct	-0.256	0.062	0.001

There is a significant relationship between psychological disorders, social and biological factors, adaptive and maladaptive emotion regulation strategies, and life satisfaction. Additionally, the results showed that the indirect relationship between psychological factors and life satisfaction through cognitive emotion regulation strategies were considered mediating variables in two adaptive and maladaptive strategies that were negatively significant (P = 0.001, β = -0.114). However, the indirect relationship between social and biological factors and life satisfaction through the mediating variable was insignificant.

Table 6: Sum of direct and indirect pathways (standardized Coefficients, Standardized Coefficients and significant levels for the structural model of the research)

Pathway(Sum direct and indirect)	β Coefficient	Standard deviation	P value
Sexual functioning	0.294	0.065	0.001
Psychological disorders	-0.325	0.0 45	0.001
Social health	0.206	0.056	0.002

Nevertheless, the overall effect of psychological, social, and biological factors (including the sum of direct and indirect pathways) on life satisfaction was significant. The results are shown in Table 6. The final model

is summarized in Figure 2. In the present study, the bootstrap test was used to evaluate the mediating relationships. Bootstrap provides the most powerful and logical method to measure indirect effects. Significant evaluation of these relationships can be examined in two ways. The first method is by referring to the significance levels, and the second method is by examining the confidence intervals. If the upper and lower limits with a 95% confidence interval are similarly marked for the intermediate path (both positive and negative), given that zero does not fall within the confidence interval, the hypothesized path can be significant at the p=0.001 level.

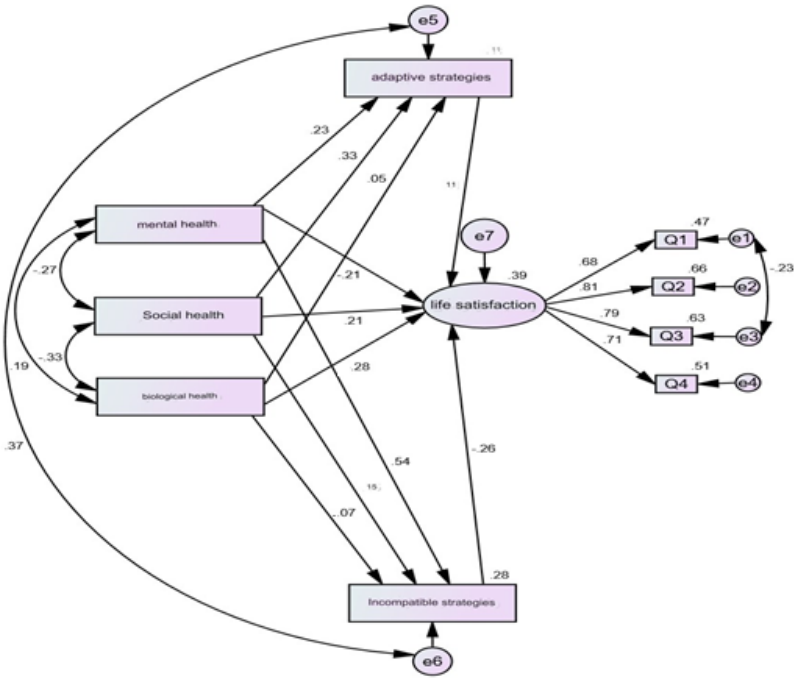

Figure 2: Final structural model

Discussion

As previously mentioned, this study aimed to develop a structural model to examine the relationship between sexual function and psychosocial factors with life satisfaction in endometriosis women by mediation of cognitive emotion regulation strategies. To our knowledge, this is the first study that evaluates bio-psychosocial factors with these variables (FSFI-6, SCL-25, Social Health Keyes-20, CERQ-18, and SWLS-5) in women with endometriosis. The result supports the hypothesis of this study: "Both female sexual function and social health have a positive significant effect on life satisfaction." These results are consistent with many studies that have confirmed the positive impact of sexual function on quality of life and life satisfaction (Montanari et al., 2013; Tripoli et al., 2011). Also, the SCL factor has a significant reverse correlation with social health and life satisfaction. Previous studies have been conducted in this regard and reported disruption of sexual relationships and psychological disorders negatively affect the quality of life, family relationships, and life satisfaction (Facchion et al., 2015; Terkuile et al., 2010; Goshtasebi et al., 2011; Tadris Tabrizi et al., 2022).

Other findings highlighted the relationship between maladaptive cognitive emotion regulation strategies and life satisfaction was negatively significant. Some Studies supported this result and expressed that adaptive

cognitive emotion regulation strategies are strongly related to life satisfaction, and positive emotions will lead to better life satisfaction (Boiger et al., 2013; Kashdan et al., 2015). The connection between maladaptive strategies and psychological disorders was positive and significant. In explaining the result, we can state that adoptive strategies could enhance positive emotions by reducing negative feelings and increasing positive sensations. Similar to the result, other studies have shown that mal-adoptive strategies are favorably connected to depression or other psychological symptoms, whereas adaptive strategies are negatively related (Omran et al., 2011; Suri et al., 2013). However, overly focusing on positive emotions can backfire. So, it is crucial to learn how to apply adaptive cognitive emotion regulation strategies to balance positive and negative emotions. Also, Findings demonstrated there is a negative significant relationship between both sexual function and social health with psychological disorders. Consistency with findings, some studies indicated depression in endometriosis patients potentially reduces the effect of treatments and enhances social vulnerabilities (Mendes et al., 2012; Facchin et al., 2015); in addition, depression has been associated with impairment of sexual function in women with endometriosis (Rossi et al., 2022). In the present study, the majority of patients indicated experiencing severe intercourse pain, and many demonstrated a high prevalence of maladaptive cognitive emotion regulation strategies. It is linked to an automatic need to control pain, which leads the woman to engage in various unsuccessful coping strategies. Personal experiences of pain affect emotional functioning, and high levels of anxiety and depression can amplify the severity of the pain. Moreover, women with severe menstrual pain reported low rates of sexual function and showed less psychological health. In explanation, it can express onset of pain in endometriosis is associated with an automatic need for control, prompting women to adopt a range of ineffective coping strategies. Personal experience of pain significantly influences emotional functioning, while elevated levels of anxiety and depression can further intensify pain severity.

Pain generally triggers a range of negative emotions, including tension, fear, and ruminative or catastrophizing thoughts, impacting various aspects of patients' lives. It is also associated with a variety of physical and psychosocial adverse effects, including impairments in sexual relationships. Moreover, in this study, contrary to our expectation, infertile women with endometriosis reported significantly higher scores in female sexual function than women without infertility. In psychological disorders, social health and life satisfaction of fertile women showed higher scores than infertile women, but it was not significant. This result is supported by Naushad et al. (2018), who reported there are no significant differences in depressive symptoms between endometriosis women with and without fertility. Carvalho et al. (2015) stated infertility is a risk factor for mental disorders; in addition, it negatively impacts family life, which also is a threatening factor for social and mental conditions.

In this study, we explored psychological factors (SCL) that are indirectly and significantly related to life satisfaction by mediating the role of cognitive emotion regulation strategies (adaptive and maladaptive). Explaining the result can aid in depression, anxiety, or other mental disorders and negative feelings and thoughts, and it's difficult to control and maintain positive emotions; therefore, most people in this situation use maladaptive strategies, then the level of quality of life and life satisfaction will be reduced. However, the indirect relationship between social and biological factors (FSFI) of life satisfaction through the mediating cognitive emotion regulation was insignificant. The present study encountered several limitations. It was conducted in Tehran using convenience (non-random) sampling without considering cultural and ethnic

diversity, which restricts the generalizability of the findings to populations in other cities. Additionally, the lack of control over the effect of endometriosis and personal variables of the sample group was another limitation. Although in this study we stated pain, we didn't use any instrument to measure it, and we don't have a pain score in this study.

Additionally, one fact about our study is that it was not a multicenter. We relied on women coming to one center as a referral center for women and one gynecological office in Tehran, Iran. Finally, all variables were assessed using self-report methods, meaning that the strength of associations may have been artificially increased by common method bias. In general, with appropriate psychological intervention, women with endometriosis can improve their life satisfaction. Biological, social, and psychological consequences of endometriosis are opening a new perspective on the management of women's health in these patients. According to the results of the present study, further studies are needed to examine intervention strategies that may enhance life satisfaction among women with endometriosis, focusing on the enhancement of adaptive emotion regulation skills.

Conclusion

This study suggests significant relationships between psychological, social, and biological health and life satisfaction in women with endometriosis, mediated by emotion regulation strategies. Adaptive strategies positively correlate, whereas maladaptive strategies demonstrate negative impacts. The comprehensive analysis of these relationships underscores the complex interplay between health factors and emotional coping mechanisms affecting life satisfaction in this population.

Acknowledgment

We extend our sincere gratitude to all the women with endometriosis who participated in this study and contributed to its success.

Funding

No financial support was received from any funding agency.

Conflict of interest

There are no conflicts of interest associated with this publication and there has been no significant financial support for this work.

References

Aerts L, Grangier L, Streuli I, et al. (2018). Psychosocial impact of endometriosis: from co-morbidity to intervention. *Best Pract Res Clin Obstet Gynaecol*, 50: 2–10.

Rogers, P. A., D'Hooghe, T. M., Fazleabas, A., Gargett, C. E., Giudice, L. C., Montgomery, G. W., & et al. (2009). Priorities for endometriosis research: recommendations from an international consensus workshop. *Reproductive Sciences,* 16(4), 335–346.

DiVasta AD, Vitonis AF, Laufer MR, et al. (2018). Spectrum of symptoms in women diagnosed with endometriosis during adolescence vs. adulthood. *Am J Obstet Gynecol*. 218(3):324.e1–324.e11.

Dunselman GA, Vermeulen N, Becker C, et al., (2014). European Society of Human Reproduction Embryology (ESHRE) guideline: management of women with endometriosis. *Hum Reprod*; 29:400–412.

Vercellini P, Viganò P, Somigliana E, et al. (2014). Endometriosis: pathogenesis and treatment. *Nat Rev Endocrinol*. 10(5): 261–275.

Missmer, S. A., Tu, F., Soliman, A. M., & et al. (2022). Impact of endometriosis on women's life decisions and goal

attainment: a cross-sectional survey of members of an online patient community. *BMJ Open.* Article e052765.

Laganà, A. S., Vitale, S. G., Trovato, M. A., & et al. (2016). Full-thickness excision versus shaving by laparoscopy for intestinal deep infiltrating endometriosis: rationale and potential treatment options. *Biomedical Research International*, Article 3617179.

Facchin F, Saita E, Barbara G, Dridi D, Vercellini P.(2017). 'Free butterflies will come out of these deep wounds': A grounded theory of how endometriosis affects women's psychological health. *J Health Psych.* DOI: 10. 1177/1359105316688952.

Shahraki Z, Tanha FD, Ghajarzadeh M. (2018). Depression, sexual dysfunc-tion and sexual quality of life in women with infertility. *BMCWomens Health*; 18(1):92.

Pope, C. J., Sharma, V., Sharma, S., & Mazmanian, D. (2015). A systematic review of the association between psychiatric disturbances and endometriosis. *Journal of Obstetrics and Gynaecology Canada,* 37, 1006–1015.

Kołtuniuk, A., Przestrzelska, M., Karnas, A., et al. (2020). The Association between Sexual Disorders and the Quality of Life of Woman Patients with Multiple Sclerosis: Findings of a Prospective, Observational, and Cross-Sectional Survey. *Sex Med*, 8:297–306.

Bernays, V., Schwartz, A. K., Geraedts, K., & et al. (2020). Qualitative and quantitative aspects of sex life in the context of endometriosis: a multicentre case control study. Reproductive BioMedicine Online, 40, 296-304.

Cozzolino, M., Magro-Malosso, E. R., Tofani, L., & et al. (2018). Evaluation of sexual function in women with deep infiltrating endometriosis. Sexual & Reproductive Healthcare, 16, 6-9.

Culley L, Law C, Hudson N, Denny E, Mitchell H, Baumgarten M,et al. (2013).The social and psychological impact of endometriosis onwomen's lives: a critical narrative review. *Hum Reprod Update*; 19(6):625—39.

Brosens I, Gordts S, Benagiano G. (2013). Endometriosis in adolescents is a hidden, progressive and severe disease that deserves attention, not just compassion. *Hum Reprod;* 28:2026–2031.

Roomaney R, Kagee A. (2018). Salient aspects of quality of life amongwomen diagnosed with endometriosis: a qualitative study. *JHealth Psychol*; 23(7):905—16.

Cavaggioni, G., Lia, C., Resta, S., & et al. (2014). Are mood and anxiety disorders and alexithymia associated with endometriosis? A preliminary study. *Biomedical Research International,* Article 786830.

Berking, M., and Lukas, C. A. (2015). *Current Opinion in Psychology: The Affect Regulation Training (ART): a transdiagnostic approach to the prevention and treatment of mental disorders*.

Steger, M. F., Frazier, P., Kaler, M., and Oishi, S. (2006). The meaning in life questionnaire: assessing the presence of and search for meaning in life. *J. Couns. Psychol.* 53, 80–93. doi: 10.1037/0022-0167.53.1.80

Shahpanah, M., Noury Ghasem Abadi, R., & Seirafi, M. (2022). Predicting Health-Related Quality of Life based on Emotion Regulation with Mediating Role of Self-Care in Patients with Coronary Artery Disease. *Iranian Journal of Health Psychology*, 5(3), 59-68.

Mills, S. E. E., Nicolson, K. P., and Smith, B. H. (2019). Chronic pain: A review of its epidemiology and associated factors in population-based studies. *Br. J. Anaesth.* 123, e273–e283. doi: 10.1016/j.bja.2019.03.023

Isidori AM, Pozza C, Esposito K, Giugliano D, Morano S, Vignozzi L, et al. Development and validation of a 6-item version of the female sexual function index (FSFI) as a diagnostic tool for female sexual dysfunction. J Sex Med. 2010;7(03):1139–1146. Doi: 10.1111/j.1743-6109.2009.01635.x

Maroufizadeh, S., Riazi, H., Lotfollahi, H., Omani-Samani, R., & Amini, P. (2020). The 6-item Female Sexual Function Index (FSFI-6): factor structure, reliability, and demographic correlates among infertile women in Iran. *Middle East Fertility Society Journal,* 24, 1-6.

Derogatis, L. R., Lipman, R. S., & Covi, L. (1973). SCL-90: an outpatient psychiatric rating scale-preliminary report. *Psychopharmacology Bulletin,* 9, 13-28.

Najarian, B., & Davodi, I. (2001). Development and reliability of SCL-25; short form of SCL-90. *Journal of Psychology*,

18, 136-149. (Persian)

Keyes, C. M., & Shapiro, A. (2004). Social well-being in the United States: A descriptive epidemiology. *In The Social Science Journal (pp. 350-372). Chicago, IL: The University of Chicago Press*.

Garnefski N, Kraaij V (2006). Cognitive emotion regulation questionnairedevelopment of a short 18-item version (CERQ-short*). Per Individl Differ*; 41(6):1045-53. [DOI:10.1016/j.paid.2006.04.010]

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71-75.

Montanari, G., Di Donato, N., Benfenati, A., Giovanardi, G., Zannoni, L., Vicenzi, C., Solfrini, S., Mignemi, G., Villa, G., Mabrouk, M., & et al. (2013). Women with deep infiltrating endometriosis: Sexual satisfaction, desire, orgasm, and pelvic problem interference with sex. *Journal of Sexual Medicine,* 10, 1559–1566.

Tripoli, T. M., Sato, H., Sartori, M. G., de Araujo, F. F., Girão, M. J., & Schor, E. (2011). Evaluation of quality of life and sexual satisfaction in women suffering from chronic pelvic pain with or without endometriosis. *Journal of Sexual Medicine*, 8(2), 497–503.

Facchin, F., Barbara, G., Saita, E., Mosconi, P., Roberto, A., Fedele, L., & Vercellini, P. (2015). Impact of endometriosis on quality of life and mental health: pelvic pain makes the difference. *Journal of Psychosomatic Obstetrics & Gynecology*, 36, 135–141.

Ter Kuile, M. M., Weijenborg, P. T. M., & Spinhoven, P. (2010). Sexual functioning in women with chronic pelvic pain: the role of anxiety and depression. *Journal of Sexual Medicine*, 7(5), 1901-1910.

Goshtasebi, A., Nematollahzadeh, M., Hariri, F. Z., & Montazeri, A. (2011). The short form endometriosis health profile (EHP-5): translation validation study of the Iranian version. *Journal of Ovarian Research*, 4, 11.

Tadris Tabrizi, M., Saffarinia, M., Aliakbari, M., & Alipor, A. (2022). Structural Model of Women's Sexual Health Based on Alexithymia, Differentiation of Self, and Gender Roles Mediating by Social Exchange Styles. *Iranian Journal of Health Psychology*, *5*(3), 17-34.

Sharifian, M., Saffarinia, M., Alizadehfard, S. (2018). The role of gender schemas by mediating fairness style in predicting sexual pain disorder: Study of structural equation model. *Health Psychology*, 7(27): 169-190. [Persian].

Omran, M. P. (2011). Relationships between cognitive emotion regulation strategies with depression and anxiety. *Open Journal of Psychiatry*, 1, 106–109. https://doi.org/10.4236/ojpsych.2011.13015

Suri, G., Sheppes, G., & Gross, J. (2013). Emotion regulation and cognition. In M. D. Robinson, E. Watkins, & E. Harmon-Jones (Eds.), *Handbook of Cognition and Emotion (pp. 196).* The Guilford Press.

Boiger, M., Mesquita, B., Uchida, Y., and Feldman Barrett, L. (2013). Condoned or condemned: the situational affordance of anger and shame in the United States and Japan. *Personal. Soc. Psychol. Bull.* 39, 540–553. doi: 10.1177/014616721347820.

Kashdan, T. B., Young, K. C., and Machell, K. A. (2015). Positive emotion regulation: addressing two myths. *Curr. Opin. Psychol.* 3, 117–121. doi: 10.1016/j.copsyc.2014.12.012.

Mendes, N., & Figueiredo, B. (2012). Psychological approach to endometriosis: women's pain experience and quality of life improvement. *Psicologia, Saúde e Doenças*, *13*(1), 36-48.

Rossi, V., Galizia, R., Tripodi, F., Simonelli, C., Porpora, M. G., & Nimbi, F. M. (2022). Endometriosis and sexual functioning: how much do cognitive and psycho-emotional factors matter? *International Journal of Environmental Research and Public Health,* 19(9), 5319.

Naushad, N., Dunn, L. B., Muñoz, R. F., & Leykin, Y. (2018). Depression increases subjective stigma of chronic pain. *Journal of Affective Disorders,* 229, 456–462.

Carvalho, A. C. F., Poli, O. B., Crippa, J. A. D. S., Hallak, J. E. C., & Osorio, F. D. L. (2015). Associations between chronic pelvic pain and psychiatric disorders and symptoms. *Archives of Clinical Psychiatry*, 42(1), 25-30.