

Development of a Structural Model of Quality of Life Based on Resilience with the Mediation of Perceived Stress in Women with Rheumatoid Arthritis

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ABSTRACT

Objective: Musculoskeletal diseases are among the most common and costly illnesses across all age groups and various communities, leading to disability, incapacity, early retirement, and job loss. The present study aimed to develop a structural model of quality of life based on resilience with the mediation of perceived stress in women with rheumatoid arthritis.

Methods: The research method was descriptive-survey with a structural equation modeling design. The statistical population included women with rheumatoid arthritis in the city of Isfahan. The women with rheumatoid arthritis referred to medical centers in Isfahan had at least one year of disease history. Data were collected using the Varni-Kazisnki and Keller Quality of Life Questionnaire (1996), the Connor-Davidson Resilience Scale, Antonovsky's Sense of Coherence Questionnaire (1993), Cohen, Kamarck, and Mermelstein's Perceived Stress Questionnaire (1983), and the Gratz and Roemer Emotion Regulation Difficulty Scale (2004). Data were analyzed using structural equation modeling and Amos26 software.

Findings: The results showed that the direct effect of resilience on the quality of life of patients with rheumatoid arthritis was significant ($\beta = 0.25$; $P < 0.01$). The indirect effect of resilience through the mediation of perceived stress on the quality of life of patients with rheumatoid arthritis was significant ($\beta = 0.16$; $P < 0.01$). Additionally, the total effect of resilience through the mediation of perceived stress on quality of life was significant ($\beta = 0.41$; $P < 0.01$).

Conclusion: It can be concluded that the structural model of quality of life based on resilience with the mediation of perceived stress was well-fitted, and perceived stress played a mediating role in the relationship between quality of life and resilience in women with rheumatoid arthritis.

Keywords: *Quality of life, resilience, perceived stress, rheumatoid arthritis.*

1. Introduction

Rheumatoid arthritis is one of the most common chronic unknown diseases and a major cause of disabilities, especially in adulthood. This chronic, systemic inflammatory disease is seen only in humans, and its cause is unknown; it is associated with joint involvement (Suh et al., 2022). Today, this disease has become very prevalent, and reports of its increasing trend have been presented in all societies. The nature of this chronic inflammatory immune disease causes symptoms such as pain, hyperalgesia, and edema in patients, leading to psychological problems. Therefore, considerable attention is given to this disease today because, in addition to treatment costs, it reduces individuals' quality of life (Suh et al., 2022).

Quality of life is a broad concept influenced by various aspects of physical health, psychological states, level of independence, social relationships, and their prominent manifestation in the individual's living environment (Ilić et al., 2019). Quality of life results from the interaction between individuals' personalities and the continuity of life events, and despite being a multifaceted and complex concept, it is definable and measurable (Bongers et al., 2020). Quality of life is the individual's subjective perception of the fulfillment of their important goals, needs, and aspirations. Therefore, quality of life is a cognitive judgment about the gap between the individual's current reality and their ideal life situations, which evokes positive or negative emotional behavior (Pérez-Flores et al., 2020). Quality of life is a dynamic and subjective structure that compares past living conditions with recent events, encompassing all positive and negative aspects. The subjective nature of quality of life refers to individuals' perceptions of their living conditions rather than others' reports and stems from satisfaction or dissatisfaction with life domains that matter to the individual. Therefore, patients with similar problems may have different views on their quality of life and report it in various ways. Obtaining information on the daily challenges faced by patients with rheumatoid arthritis and how it affects their quality of life can play a significant role in nursing care and improve the performance of the treatment team, enhancing the quality of planning and evaluating care. Another important factor predicting quality of life in chronic diseases is treatment adherence (Uysal & Sirgy, 2019).

Another variable that seems to mediate the relationship between resilience and quality of life and treatment adherence is perceived stress. Stress is the nonspecific

response of the body to any demand placed upon it. Individuals' perception of their stress affects how they respond to it. Stress is a serious threat that can lead to psychological or physical illnesses or may have significant negative impacts on individual performance (Jin et al., 2023). The construct of perceived stress derives from Lazarus and Folkman's concept of stress as the individual's cognitive appraisal of negative life events. Perceived stress is defined as the degree to which situations in one's life are appraised as stressful (Lee et al., 2022). In fact, perceived stress refers to the inability to cope with stressful conditions in anxious individuals, creating a real threat to the psychological and physical balance of the body (Davis et al., 2018). Researchers believe that while some level of stress is appropriate for alleviating boredom and low motivation, persistent stress-related symptoms can weaken mental and physical health and reduce work and learning efficiency (De Cock et al., 2022). Today, researchers are paying significant attention to positive psychology constructs. Considering the severe complications of this disease, fear of the disease, and disruption of daily activities, attention to positive psychology variables in dealing with this disease can be crucial, including the sense of coherence.

Another positive psychology construct that has gained much attention in health discussions is resilience. Resilience, simply put, is positive adaptation in response to adverse conditions. In other words, resilience is defined as successful resistance to threatening and challenging situations (Eyni et al., 2020). Resilience is the ability and capacity to overcome stress, accidents, and disasters. Research shows that highly resilient individuals demonstrate less avoidance behavior and cope with issues arising from their illness without a catastrophic outlook on their problems (Darbani & Parsakia, 2023; Golparvar & Parsakia, 2023). Resilience is defined as the ability to withstand changes (Panpakdee & Limnirankul, 2018) and the positive capacity to adapt to stress (Karakoyun et al., 2022). Resilience is the ability and skill to adapt positively to stress and challenging conditions, such as chronic illness. In other words, successful adaptation to life's challenging conditions is termed resilience. Resilience involves adjusting control levels according to environmental conditions. As a result of this adaptive flexibility, highly resilient individuals are more likely to experience positive emotions, have higher self-confidence, and better psychological adjustment compared to those with low resilience. Once a disaster has passed and basic human needs are met, resilience emerges. Through the process of resilience, adverse effects are modified or even disappear,

and mental health is preserved. Individuals with chronic diseases must learn adaptive skills and apply them in facing daily challenges. Characteristics of resilient individuals include experiencing positive emotional and cognitive outcomes, self-esteem, social functioning, and resistance to negative outcomes of adverse life events. Resilience means returning to the initial balance or achieving a higher balance in threatening conditions, thus facilitating successful adaptation in life (Shan et al., 2023).

Reviewing the literature shows that most psychological studies conducted on these patients have examined variables such as general health and sleep quality, levels of depression and anxiety, quality of life, pain acceptance, and coping strategies (Kiamarsi et al., 2020). However, no study aiming to develop a model to improve these patients' psychological problems was found in the research literature. The absence of such a study in rheumatoid arthritis patients and the contradictory results of previous studies present the primary challenge and gap that necessitates this study. Since quality of life and treatment adherence in patients with chronic rheumatoid arthritis is crucial, identifying and strengthening related factors is a main concern for health officials. On the other hand, treatment adherence is a key factor in controlling chronic diseases. Therefore, given the aforementioned points, the primary question of this research is whether resilience and coherence predict the quality of life and treatment adherence in patients with rheumatoid arthritis and whether emotional regulation and perceived stress play a mediating role in this relationship.

2. Methods

2.1. Study design and Participant

The present research method was descriptive-survey with a structural equation modeling design. The statistical population included women with rheumatoid arthritis who referred to medical centers in the city of Isfahan in 2022. To determine the sample size in modeling research, 10 to 15 individuals are needed for each observed variable, and based on the existing variables, 200 individuals were selected by convenience sampling. Inclusion criteria included having at least one year of disease history, educational level above a high school diploma, and absence of psychological problems that would affect their responses. Ethical considerations for this study were as follows: participants were provided with written information about the study's purpose and function, and they could participate if willing. They were assured that all information would remain confidential and used solely

for research purposes. To maintain privacy, participants' names and surnames were not recorded.

After obtaining the necessary introduction letters and ethics committee approval from the university, the researcher visited the research environment. The researcher then approached the research deputy or educational supervisor of the selected hospitals to obtain an introduction letter for clinic visits. Consequently, the researcher personally collected data during morning shifts every day except holidays in clinics affiliated with Isfahan and Iran Medical Sciences Universities. Eligible participants were selected, introduced to the study, given a detailed explanation of the research goal, assured of confidentiality, and provided written consent. Questionnaires were then distributed for completion.

2.2. Measures

2.2.1. Quality of Life

The 12-item quality of life questionnaire was designed by Varni-Kazisnki and Keller in 1996. This questionnaire has 8 subscales, and often the overall score is used due to the limited number of items. The present questionnaire examines quality of life in terms of general understanding of (self-health, physical functioning, physical health, emotional problems, physical pain, social functioning, vitality and energy, and mental health). Varni and colleagues (1996) were the first to examine the validity and reliability of this scale. Test-retest reliability was calculated, and Cronbach's alpha for the 12 physical items was 0.89, and for the 12 mental items, it was 0.76, indicating good reliability. The validity of this questionnaire was examined by Varni and colleagues through empirical validity and by Kontodimopoulos and colleagues (2007) through construct validity, with satisfactory evidence reported in each study. Montazeri et al. (2009) also examined the validity and reliability of this scale in Iran. They used the test-retest method to examine reliability, reporting reliabilities of 0.73 and 0.72 for the 12 physical and mental items, respectively. They examined the validity using convergent validity, showing high correlations between the questions of the 4 physical subscale items with the total physical subscale score and high correlations between the 3 mental subscale items with the total mental score (Ferwerda et al., 2018).

2.2.2. *Resilience*

This scale, with 25 items, was developed by Connor and Davidson (2003) to measure resilience on a five-point Likert scale, with each item scored between 0 (not true at all) and 4 (true nearly all the time), resulting in a score range of 0 to 100. Factor analysis indicated five factors: personal competence, trust in individual instincts, tolerance of negative affect, positive acceptance of change, and secure relationships, control, and spiritual influences. Connor and Davidson reported a Cronbach's alpha of 0.89 for the resilience scale, and test-retest reliability over a four-week interval was 0.87. Resilience scores were positively correlated with the Kobasa Hardiness Scale and negatively correlated with the Perceived Stress Scale and Sheehan Stress Vulnerability Scale, indicating concurrent validity. Resilience scores did not significantly correlate with the Arizona Sexual Experience Scale at the beginning or end of the study, indicating discriminant validity. Mohammadi (2005) administered the scale to 248 individuals, confirming its reliability with a Cronbach's alpha of 0.89 and validating it through factor analysis, adapting it for use in Iran. Reliability was recalculated by Kordmirza and Nikoozadeh (2009) with an overall Cronbach's alpha of 0.90. In a study by Samani, Jokar, and Sahragard (2006) among students, test validity (through factor analysis and convergent and divergent validity with life satisfaction and neuroticism scales) was confirmed in normal and at-risk groups. Keyhani et al. (2014) considered concurrent validity by examining correlations among self-efficacy, aggression, and life satisfaction with resilience. The results showed negative correlations between resilience and aggression and positive correlations with self-efficacy and life satisfaction (Darbani & Parsakia, 2023).

2.2.3. *Perceived Stress*

The Perceived Stress Scale was developed by Cohen et al. in 1983 and contains 14 items, each answered on a five-

point Likert scale (never, almost never, sometimes, fairly often, very often) scored 0 to 4. The scale measures two subscales: a) negative perception of stress (items 1, 2, 3, 4, 11, 12, and 14) and b) positive perception of stress (items 5, 6, 7, 8, 9, 10, and 13), reverse-scored. Internal consistency reliability coefficients ranged from 0.84 to 0.86 in two student groups and a group of smokers in a quit program. Mimura and Griffiths found Cronbach's alpha coefficients of 0.88 and 0.81 for the original and revised Japanese scales, respectively, close to the original scale's reliability. Factor analysis of the original scale explained 53.2% of the variance, with the first factor accounting for 27.3% and the second for 25.9%. The revised Japanese scale explained 49.9% of the variance, with the first factor accounting for 28.5% and the second for 21.4%. Ahmadian (2012) reported Cronbach's alpha coefficients of 0.71 for positive perception of stress and 0.75 for negative perception, with 0.84 for the overall perceived stress score. Item analysis showed correlation coefficients ranging from 0.49 to 0.70 for positive perception and from 0.52 to 0.77 for negative perception, with overall perceived stress item correlations ranging from 0.51 to 0.78 (Kiamarsi et al., 2020; Sedaghat & Afraee, 2022).

2.3. *Data Analysis*

Data were analyzed using means and standard deviations in the descriptive section and structural equation modeling with AMOS-26 software in the inferential section.

3. Findings and Results

The research sample included 214 women. The mean (standard deviation) age of the participants in this study was 37.85 (7.44).

Table 1

Descriptive Statistics of the Research Variables (n=214)

Variable	Mean	Standard Deviation	Range	Skewness	Kurtosis
Resilience	49.71	15.08	1-100	0.004	0.224
Perceived Stress	30.19	8.45	12-56	0.254	-0.340
Quality of Life	37.20	8.78	12-60	-0.140	-0.290

According to the data in Table 1, the skewness and kurtosis of all research variables are between -2 and 2,

indicating a normal distribution of the data. Thus, AMOS software and parametric tests such as Pearson correlation coefficient were used for inferential data analysis.

Table 2

Correlation Matrix Between Predictor, Mediator, and Dependent Variables of the Proposed Model

Variable	1	2	3
Resilience	1		
Perceived Stress	-0.475**	1	
Quality of Life	0.351**	-0.240**	1

**p<0.01

As shown in Table 2, there is a significant relationship among resilience, quality of life, and perceived stress ($p < 0.01$). The relationship between perceived stress and each of the variables resilience and quality of life is significant and inverse ($p < 0.01$). The proposed model fit indices, including the chi-square as an absolute fit index, are reported in Table 3. The closer the chi-square value is to zero, the better the model fit. A significant chi-square indicates a significant difference between the hypothesized and observed covariances. However, since the chi-square formula includes sample size, its value inflates with large samples and usually becomes statistically significant. Therefore, many researchers examine the chi-square relative to its degrees of freedom (CMIN/DF). In the relative chi-square index, values

close to 2 or less are considered a conventional criterion for model fit. Other fit indices reported in this study include the Parsimonious Normed Fit Index (PNFI), Comparative Fit Index (CFI), Parsimonious Comparative Fit Index (PCFI), Incremental Fit Index (IFI), Goodness of Fit Index (GFI), and Root Mean Square Error of Approximation (RMSEA).

As indicated by the results, the fit indices (PCFI = 0.590, PNFI = 0.632, CMIN/DF = 2.83, RMSEA = 0.078, IFI = 0.944, CFI = 0.928, GFI = 0.942) suggest a good fit of the proposed model with the data. Therefore, the proposed model demonstrates satisfactory fit. The direct path coefficients, indirect effects, and total effects are reported in Table 3.

Table 3

Standardized Coefficients of Direct Effects, Indirect Effects, and Total Effects of Model Variables

From	To	Mediating Variable	Direct Effect	Indirect Effect	Total Effect	Significance
Resilience	Quality of Life	-	0.25	-	0.25	P < 0.01
Resilience	Perceived Stress	-	0.25	0.16	0.41	P < 0.01
Perceived Stress	-	-	-0.39	-	-0.39	P < 0.01
Perceived Stress	Quality of Life	-	-0.40	-	-0.38	P < 0.01

As reported in Table 3, the direct effect of resilience on the quality of life of patients with rheumatoid arthritis is significant and positive, with an effect size of 0.25 ($p < 0.01$). The indirect effect of resilience through the mediation of perceived stress on the quality of life of patients with rheumatoid arthritis is significant with an effect size of 0.16 ($p < 0.01$). Additionally, the total effect of resilience through the mediation of perceived stress on the quality of life is 0.41 ($p < 0.01$).

4. Discussion and Conclusion

The results showed that the structural model of quality of life based on resilience with the mediation of perceived

stress in women with rheumatoid arthritis had a good fit. These findings are consistent with the prior studies (Harris et al., 2023; Morf et al., 2021; Wang et al., 2021).

To explain this finding, it can be stated that rheumatoid arthritis leads to high levels of perceived stress in these patients, maintaining negative mood states and stress in a vicious cognitive cycle. Psychological stress activates the sympathetic system. Some patients hold negative beliefs about their emotions, such as the belief that their emotions are meaningless, will continue forever, will bring them down, are embarrassing, are unique to them, are inexpressible, and will never be validated. These individuals are more likely to use troublesome coping methods, such as

stress and negative emotional strategies (Soria-Reyes et al., 2023). Others have more positive or adaptive views towards emotions and are more able to validate them. These individuals view their emotions as meaningful, acceptable, not embarrassing, not unique to them, and transient. As a result, such individuals are less likely to use troublesome coping strategies (Lee et al., 2022). We thus witness the potential for interdependent methods of emotional processing and the determining role of stress in changing brain-gut functions through emotional regulation mechanisms. Overall, a complex pattern emerges that researchers have not yet fully understood or explained.

It can also be stated that resilience, by its nature, allows individuals to think and act more resiliently when facing problems and stressful situations. Given that individuals with rheumatoid arthritis are constantly besieged by a series of distressing thoughts, resilience affects thought processes as a fundamental feeling of individual control, enabling the drawing and access to a list of resilient strategies (Wang et al., 2021). Thus, resilience plays a crucial role in facing stressful life events and acts as a source of resistance and a protective shield. In other words, by enhancing resilience, an individual can withstand and overcome stressors and factors causing stress. Therefore, resilience moderates and diminishes factors such as stress, ensuring the quality of life.

According to the reported results, the direct effect of resilience on the quality of life of patients with rheumatoid arthritis is significant and positive. These findings are consistent with the findings of Katchmart et al. (2019). This can be explained by the fact that resilience refers to positive adaptation in life despite the presence of problems (Katchmart et al., 2019). In challenging and stressful conditions, a resilient individual can integrate personal (internal) and external resources and overcome the problem (Moens et al., 2022). Resilience can act as a protective shield against life challenges. Theories and models related to quality of life state that quality of life is a dynamic concept that changes under different conditions. The concept of quality of life also refers to the overall satisfaction of an individual with life; therefore, in stressful and challenging conditions, an individual's quality of life levels decrease. However, resilient individuals, due to their resilience shield and high power in adapting to stressful conditions, problem-solving skills, creative thinking, emotional management and self-control, external support seeking, and more, approach problems in new ways and can solve them (Jin et al., 2023). Consequently, their sense of self-efficacy, control, power, and capability increases. Therefore, their levels of life

satisfaction, due to experiencing positive emotions from success, also rise, and they report higher quality of life. Individuals with high resilience maintain their psychological health in stressful conditions and adverse situations and exhibit psychological adaptation (Chiesi et al., 2022). In reality, resilience influences individuals' feelings and emotions, leading to positive attitudes and, consequently, life satisfaction and quality of life. Individuals with high resilience evaluate stressful situations and then adopt logical solutions, guiding those situations in their desired direction. In such conditions, these individuals feel contentment, self-belief, and confidence.

According to the reported results, the indirect effect of resilience through the mediation of perceived stress on the quality of life of patients with rheumatoid arthritis is significant. Additionally, the total effect of resilience through the mediation of perceived stress on quality of life is also significant. These findings are consistent with the prior findings (Hildon et al., 2010; Oliva et al., 2022; Sedighi Arfaee et al., 2021; Wang et al., 2021).

To explain this finding, it can be stated that the concept of perceived stress refers to an individual's cognitive evaluation of negative life events. Individuals have reciprocal relationships with their environment. When environmental pressures and threats exceed the resources available to the individual for coping, stress is created. Perceived stress depends on the extent of pressures and the resources individuals have to cope with them. According to Lazarus's theory, stress or emotion is related to an individual's experience with the stressor, and stress responses depend on learning, growth, and culture (Wang et al., 2021). This perspective suggests that stress occurs when the situation is evaluated as both challenging or threatening and insufficient resources are available to cope with it. One of the major issues that patients struggle with is the stress of coping with the disease. Therefore, individuals with low stress tolerance find emotions unbearable and do not accept their existence, as they underestimate their ability and make every effort to avoid negative emotions and seek immediate relief. Often, in a mistaken effort to cope with their negative emotions, they engage in behavioral disorder, which leads to a reduced quality of life (Harris et al., 2023). It can also be said that perceived stress enhances individuals' capacity and ability to change. Since quality of life encompasses life satisfaction, perceived stress may influence the types of feelings and emotions an individual has, leading to a positive outlook and, consequently, higher quality of life. Sometimes, reducing stress may even bring about happiness

and satisfaction, thereby improving the quality of life. Additionally, resilient individuals are capable of planning to achieve their goals, have a positive outlook on themselves, and trust and believe in their personal abilities. These individuals have an internal locus of control, meaning they take responsibility for their circumstances and are optimistic about their lives (Soria-Reyes et al., 2023). Through reappraisal in stressful conditions, resilience causes changes in individuals' behavior styles and emotions during crises. Highly resilient individuals can better manage stress and regulate their contradictory experiences, which increases their quality of life.

5. Suggestions and Limitations

The results of this study are limited to all women with rheumatoid arthritis in the city of Isfahan and may not be generalizable to male patients with rheumatoid arthritis in other regions. The complexity and abundance of the research variables and the resulting large number of questionnaire items caused some respondents to become fatigued and frustrated while answering them. Another limitation of this study is the self-report nature of the tools used. The lack of sufficient research in this field in our country posed a challenge to this study. The cross-sectional and non-experimental nature of this study is another limitation that restricts the ability to draw causal conclusions. It is suggested that this study be conducted in other cities to compare its findings with those of this study. It is also recommended that this study be conducted on other patients and its results compared with those of this study. Considering the role of negative life stressors in subsequent studies is suggested to understand the various pathways leading to quality of life within the stress-vulnerability model framework. It is also suggested that qualitative research be conducted in this field. Considering that health literacy is a product of having education, experience, and learning, health education through the media and the Internet is suggested. The media, as the most popular communication tool, plays an effective role in promoting a healthy lifestyle and changing behavior patterns by presenting health promotion programs and educating self-care behaviors and treatment adherence. Given the findings of this study, understanding health concepts in improving self-care, treatment adherence, and emotional regulation in patients with rheumatoid arthritis is of great importance. It is recommended that the health organization provide readable, clear, and relevant educational resources on health topics

and a healthy lifestyle to the public and create the conditions for the community to control their health, especially for patients with rheumatoid arthritis, to empower individuals in health and treatment. Alongside this study, it is also recommended that educational organizations and institutions create the conditions to enhance self-care, treatment adherence, and emotional regulation in patients with rheumatoid arthritis, plan accordingly, and receive financial support to raise public awareness about health literacy and provide health information to the general public to strengthen individuals' decision-making and health maintenance capabilities.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript. This article is derived from the first author's doctoral dissertation.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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