

# Mediating Role of Psychological Resilience Between Depression and Quality of Life in Maintenance Hemodialysis Patients in Baoding City, China: A Cross-Sectional Study

Na Li

Department of Nephrology, Baoding No 1 Central Hospital of Hebei Medical University, Baoding, Hebei, People's Republic of China

Correspondence: Na Li, Department of Nephrology, Baoding No 1 Central Hospital of Hebei Medical University, Baoding Great Wall North Street No 320, Baoding, Hebei, 071000, People's Republic of China, Email [ln19821202@sina.com](mailto:ln19821202@sina.com)

**Objective:** Patients with end-stage renal disease (ESRD) are at an increased risk for emotional issues, with depression being the most prevalent psychological concern, significantly impacting their quality of life. This study aimed to explore the mediating effect of psychological resilience on the relationship between depression and quality of life in maintenance hemodialysis (MHD) patients.

**Methods:** This cross-sectional study aimed to explore the mediating effect of psychological resilience on the relationship between depression and quality of life in MHD patients in Baoding, China. Conducted from January 2024 to July 2024, the study involved a questionnaire survey of 215 MHD patients across five hospitals in Baoding. Data were collected using General information questionnaire, Hemodialysis Patient Depression Scale, Psychological Resilience Scale, and Quality of Life Scale, and structural equation modeling using AMOS 21.0 was employed to analyze the mediating effect.

**Results:** The scores for depression, psychological resilience, and quality of life in these MHD patients were  $9.37 \pm 4.6$ ,  $30.58 \pm 6.1$ , and  $59.48 \pm 9.3$ , respectively. Depression had a negative correlation with quality of life, while psychological resilience had a positive correlation with quality of life (with correlation coefficients of  $-0.453$  and  $0.578$ , respectively, all  $P < 0.01$ ). Psychological resilience played a mediating role in the relationship between depression and quality of life ( $\beta = -0.13$ ,  $P < 0.05$ ), with the mediating effect analysis showing a significant indirect effect of depression on quality of life. The direct and indirect effects of depression on quality of life were  $-0.34$  and  $-0.13$ , respectively, with a total effect of  $-0.47$ . The mediating effect accounted for 27.7% of the total effect. Interpretation: PHQ-9 scores range from 0 to 27, with higher scores indicating more severe depressive symptoms. CD-RISC scores range from 0 to 100, with higher scores reflecting greater psychological resilience. SF-12 scores range from 0 to 100, with higher scores indicating a better quality of life.

**Conclusion:** Depression, psychological resilience, and quality of life in MHD patients were at a moderately low level. Depression in MHD patients can indirectly affect their quality of life through psychological resilience, suggesting that healthcare professionals should take measures to reduce depression levels, enhance psychological resilience, and ultimately improve the quality of life for these patients. Psychological resilience was identified as a significant mediator in this relationship, highlighting its potential as a target for interventions aimed at improving the mental well-being and quality of life of MHD patients. These results underscore the importance of integrating psychological support into the care of MHD patients.

**Keywords:** psychological resilience, depression, quality of life, hemodialysis

## Introduction

Maintenance hemodialysis (MHD) serves as a crucial alternative therapy for patients with end-stage renal disease (ESRD), playing a vital role in slowing down disease progression and extending patient life.<sup>1</sup> According to data from the national blood dialysis case registration system, the number of patients in China undergoing MHD treatment increased from 23.5 million in 2011 to 44.7 million in 2016, representing a 90.2% increase over five years.<sup>2</sup> However, long-term MHD treatment can lead to physical discomfort such as pain, sleep disorders, and decreased appetite.<sup>3</sup> In addition, the financial burden on families also

increases with prolonged treatment, leading to a decrease in the quality of life and adverse psychological effects for patients, with depression being a common complication among MHD patients.<sup>4-6</sup>

Maintenance hemodialysis (MHD) is associated with a range of psychiatric comorbidities, including anxiety. A systematic review and meta-analysis by Huang et al (2021) reported that the prevalence of anxiety disorders among MHD patients is significantly higher than in the general population, with a pooled prevalence of 19% for anxiety disorders and 43% for elevated anxiety symptoms.<sup>7</sup> This highlights the importance of considering anxiety in conjunction with depression when evaluating the mental health of MHD patients.

Much research confirms a high prevalence of depression and anxiety among patients with MHD. It is estimated that 23.7% of patients with MHD have depression. Additionally, MHD patients on dialysis are more likely to develop depression (34.5%) compared with patients not on dialysis (13.3%).<sup>8</sup> A meta-analysis also showed that the presence of depressive symptoms was a significant predictor of mortality in dialysis patients.<sup>9</sup>

Globally, the prevalence of depression among MHD patients varies significantly, with rates ranging from 20% to 47%.<sup>10</sup> A recent study conducted in Hodeida City, Yemen, reported a prevalence of 63%, highlighting the significant impact of depression on the quality of life of MHD patients.<sup>11</sup> This prevalence is lower than the prevalence reported in China (73.8%)<sup>12</sup> but higher than that reported in Jordan (48.5%),<sup>13</sup> where both studies utilized the same scale. These variations underscore the need for a deeper understanding of the factors contributing to depression and its impact on quality of life (QoL) among MHD patients worldwide.

Research has reported a depression prevalence rate of 21.7% to 55.1% among MHD patients in China.<sup>14</sup> A meta-analysis revealed that in China, the prevalence of depression among MHD patients over the past decade ranges from 33.8% to 46.0%.<sup>15</sup> While there have been no studies for direct comparison during the same period, when compared to the global and domestic overall rates of depression among MHD patients of 20%-47% and 21.7% to 55.1% respectively, it indirectly suggests that the prevalence of depression among MHD patients in China has been relatively high in the past 10 years.<sup>10</sup> This could be attributed to the increasing number of ESRD patients in the country, leading to a corresponding rise in the number of patients receiving MHD treatment.<sup>16</sup>

Psychological resilience is considered a potential protective factor in reducing levels of depression.<sup>17</sup> It is a good coping ability when faced with adversity, and also a self-protective potential.<sup>18</sup> Good psychological resilience can improve depressive emotions, alleviate the adverse effects of negative emotions. In addition, research has also shown that psychological resilience can effectively alleviate the impact of physical problems such as poor sleep quality on mental health. Currently, there is a lack of research on the relationship between these three factors.<sup>19</sup>

This study aims to investigate the current status of depression, psychological resilience, and quality of life in MHD patients. It will analyze the mediating effect of psychological resilience on the relationship between depression and quality of life. The findings of this study will provide important insights and guidance for improving the quality of life for these patients.

## Methods

### Study Design and Participants

Convenient sampling was used to select 215 MHD patients treated at Baoding five hospitals (two tertiary hospitals, two secondary hospitals, and one privately-owned hemodialysis center) from January 2024 to July 2024. All patients included in the study received a formalized psychiatric diagnosis by a psychiatrist before their inclusion in the study. Inclusion criteria were: 1) receiving hemodialysis treatment for  $\geq 3$  months; 2) age  $\geq 18$  years; 3) normal cognitive, communication, and understanding abilities; 4) informed consent and voluntary participation in the study. Exclusion criteria were: 1) concurrent peritoneal dialysis; 2) patients with other serious illnesses or acute diseases (defined as conditions that are life-threatening or significantly impact the patient's ability to participate in the study due to their severity or acute nature, such as severe cardiac events, recent stroke, or active cancer treatment);<sup>20</sup> 3) individuals with hearing or visual impairments, or severe psychological cognitive disruptions that hinder participation in the study.

According to Kendall's rough sample size estimation algorithm,<sup>21</sup> the sample size should be 5–10 times the number of independent variables. This study includes general information on 10 items, the Depression Scale for hemodialysis Patients

on 1 dimension, the Psychological Resilience Scale on 3 dimensions, and the Quality of Life Scale on 2 dimensions, totaling 16 independent variables. The calculated total sample size is 80–160 cases. Taking into account a 15% dropout rate, the sample size is 92–184 cases. Ultimately, this study includes a total of 215 participants. The study employed a cross-sectional design to assess the relationship between depression, psychological resilience, and quality of life in MHD patients. This design was chosen for its efficiency in capturing the prevalence of depressive symptoms and their impact on quality of life within a short period. The study has been approved by the Ethics Committee of Baoding No.1 Central Hospital (Ethics number: 2023052), and adhered strictly to the guidelines and principles outlined in the Declaration of Helsinki. The participants were informed that the data will be anonymized. To protect participants' privacy and confidentiality, data were anonymized, and questionnaires and data storage were secured on a password-protected server.<sup>22</sup>

## Study Tools

### General Information Questionnaire

Designed by the researcher according to the research objectives and significance, this questionnaire included demographic data such as age, gender, marital status, education level, frequency of dialysis, complications, payment methods, average monthly household income, hemodialysis session, and hemodialysis access.

### Patient Health Questionnaire (PHQ-9)

The Patient Health Questionnaire-9 (PHQ-9) is a health questionnaire developed by American psychiatrist Spitz in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) to screen and assess the severity of depressive symptoms in patients over the past 2 decades.<sup>23</sup> In 2009, Chinese scholars Bian Cuidong and others translated and validated the questionnaire, with a Cronbach's  $\alpha$  coefficient of 0.833, content validity of 0.934, and split-half reliability of 0.732 for the Chinese version of the scale. This study used the questionnaire to assess depressive symptoms in the research subjects, which includes 9 items such as loss of interest, low mood, sleep disturbances, fatigue, appetite changes, feelings of worthlessness, difficulty concentrating, psychomotor retardation, and suicidal thoughts. Each item is scored on a 4-point scale, with a total score ranging from 0 to 27. A score of 5 is considered the threshold for depressive symptoms, while a score of 10 indicates a tendency towards depression. Scores equal to or greater than 5 suggest the presence of depressive symptoms, with scores of 5–9 indicating mild depression, 10–14 indicating moderate depression, 15–19 indicating moderately severe depression, and 20–27 indicating severe depression. In this study, the Cronbach's  $\alpha$  coefficient for this scale was 0.755.

### Connor-Davidson Resilience Scale (CD-RISC)

Connor-Davidson Resilience Scale (CD-RISC): It utilizes a Likert 5-point scaling from 0 ("Not true at all") to 4 ("True nearly all the time"), with a scoring method that totals 100 points. The scores are positively correlated with levels of psychological resilience; scores below 60 indicate poor psychological resilience, scores between 61–69 indicate average psychological resilience, scores between 70–79 indicate good psychological resilience, and scores of 80 or higher indicate excellent psychological resilience. The CD-RISC consists of 3 dimensions (self-reliance, optimism, resilience) with a total of 25 items.<sup>24</sup> These factors are derived from the scale's items, which are scored and categorized accordingly. The reference for this categorization can be found in the original publication by Connor and Davidson, where they describe the development of the scale and its psychometric properties.<sup>25</sup> Besides, A study confirmed that the Connor-Davidson Resilience Scale (CD-RISC) has been validated in various populations, including those with chronic illnesses.<sup>26</sup> The reliability of the CD-RISC in the study was assessed using Cronbach's  $\alpha$ , which was found to be 0.873.

### SF-12 Quality of Life Scale

The SF-12 is a simplified version of the Health Survey (SF-36) developed by the Boston Medical Center in the United States.<sup>27</sup> It is used to assess an individual's physical and mental health, consisting of a total of 12 items that cover both the physical health aspect and the mental health aspect, across 2 dimensions. Scores for each dimension need to be converted to standard scores, with scores ranging from 0 to 100. The total score is obtained by adding the scores of the 2 dimensions together, with higher scores indicating a better quality of life. This scale has been widely used in Chinese populations,<sup>28</sup> with a Cronbach's  $\alpha$  coefficient of 0.72.

## Data Collection Methods

The researcher utilized uniform instructions to clearly explain the purpose and contents of the investigation to the participants. After obtaining consent, one-on-one interviews were conducted, recording information truthfully and objectively. Following the completion of the survey, timely checks were conducted to ensure the completeness and accuracy of the data. A total of 234 questionnaires were distributed for this study, with 215 valid responses received, resulting in an effective response rate of 91.88%. Ultimately, a total of 215 samples were included in the study.

## Statistical Analysis

This study utilized SPSS 26.0 for statistical analysis, employing  $\bar{x} \pm s$  to describe metric data that followed a normal distribution. Group comparisons were made using *t*-tests, while multiple group comparisons utilized one-way analysis of variance. Pearson correlation analysis was used to explore the relationship between depression, psychological resilience, and quality of life. The AMOS 21.0 was employed for mediation analysis, with statistical significance indicated by  $P < 0.05$ .

## Results

### Univariate Analysis of the Quality of Life in These MHD Patients with Different Characteristics

Univariate analysis of the quality of life in these MHD patients with different characteristics Among 215 patients with MHD, 55.4% were male and 44.6% were female. 60% of these patients underwent HD three times a week, while 40% twice a week. 55.4% of these patients had more than 3 complications, and 46.9% of them had a monthly household income of less than 3000 yuan RMB. Our study found significant differences in quality of life of these MHD patients among different genders, hemodialysis session, complications, and average monthly household income ( $p < 0.05$ ), while there were no significant differences in age, marital status, education level, dialysis frequency, hemodialysis access, and payment methods ( $p > 0.05$ ). Please refer to [Table 1](#) for specific details.

**Table 1** Quality of Life Comparison Among Maintenance Hemodialysis Patients

Variables	Total (n = 215)	Mean±SD	P
Gender, n(%)			
Male	119 (55.35)	58.12± 8.94	<b>0.009</b>
Female	96 (44.65)	61.53± 10.04	
Age (Years), n(%)			0.786
<45	95 (44.19)	60.07± 9.67	0.689
45–60	81 (37.67)	59.07± 9.26	
>60	39 (18.14)	59.78± 10.18	
Marital status, n(%)			
Married	146 (67.91)	59.82± 9.34	0.685
Divorce or widowhood	69 (32.09)	59.26± 10.01	
Education Level,(%)			0.671
Junior high school and below	88 (40.93)	60.06± 10.02	0.671
High school/vocational school,	91 (42.33)	58.98± 9.08	
College and above	36 (16.74)	60.29± 90.86	
Hemodialysis frequency/Week, n(%)			
Three times	129 (60.00)	59.41± 9.30	0.671
Twice	86 (40.00)	59.98± 10.03	

(Continued)

**Table 1** (Continued).

Variables	Total (n = 215)	Mean±SD	P
Hemodialysis session/Years, n(%)			<b>&lt;0.001</b>
<1	73 (33.95)	61.78± 9.70	
1–3	99 (46.05)	60.85± 9.54	
>3	43 (20.00)	53.23± 6.32	
Hemodialysis access, n(%)			0.155
Autogenous arteriovenous fistula	141 (65.58)	60.46± 9.60	
Semi-permanent hemodialysis catheter	66 (30.70)	57.75± 9.00	
Arteriovenous graft	8 (3.72)	60.90± 12.59	<b>&lt;0.001</b>
Complications, n(%)			
≤3	96 (44.65)	63.99± 9.30	
>3	119 (55.35)	56.13± 8.31	
Payment methods, n(%)			0.852
Health insurance	100 (46.51)	59.24± 9.53	
New Rural Cooperative Medical Care	103 (47.91)	60.00± 9.87	
Others	12 (5.58)	59.92± 7.76	
Average monthly household income (Renminbi), n(%)			<b>&lt;0.001</b>
<3000	101 (46.98)	56.73± 9.06	
3000–5000	71 (33.02)	61.92± 9.84	
>5000	42 (19.53)	65.69± 8.56	

**Notes:** Complications: the number of comorbid health issues, including but not limited to anemia, bone disease, and cardiovascular diseases, which are common in patients with end-stage renal disease undergoing hemodialysis. Bold values indicate significant differences. ( $P<0.05$ ).

## The Levels of Depression, Psychological Resilience, and Quality of Life in These MHD Patients

The mean depression score for these MHD patients was  $9.37 \pm 4.60$ , the psychological resilience score was  $30.58 \pm 6.05$ . The resilience score was  $17.45 \pm 3.12$ , accounting for 30.3% of the total score of psychological resilience, the self-reliance score was  $25.36 \pm 5.78$ , representing 40.0% of the total, and the optimism score was  $17.12 \pm 2.46$ , making up 29.7% of the total. The quality of life score was  $59.48 \pm 9.30$ . The score for physical health was  $27.32 \pm 4.72$ , representing 45.3% of the total score of quality of life, while the score for mental health was  $34.65 \pm 7.14$ , accounting for 54.7%. These scores all fell within the moderate to low range, as detailed in [Table 2](#).

## Correlation Analysis of Depression, Psychological Resilience, and Quality of Life in These MHD Patients

The results of this study demonstrated a negative correlation between depression and psychological resilience, as well as depression and quality of life ( $P<0.05$ ). Additionally, a positive correlation was found between psychological resilience and quality of life ( $P < 0.05$ ). For detailed information, please refer to [Table 3](#).

**Table 2** The Scores of Depression, Psychological Resilience, and Quality of Life in These Hemodialysis Patients

Variables	Depression	Psychological Resilience	Resilience	Self-Reliance	Optimism	Quality of Life	Physical Health	Mental Health
Score range	0–27	0–100	0–30	0–40	0–30	0–100	0–50	0–50
Score (Mean ± SD)	$9.37 \pm 4.60$	$57.58 \pm 6.05$	$17.45 \pm 3.12$	$25.36 \pm 5.78$	$17.12 \pm 2.46$	$59.48 \pm 9.30$	$27.32 \pm 4.72$	$34.65 \pm 7.14$

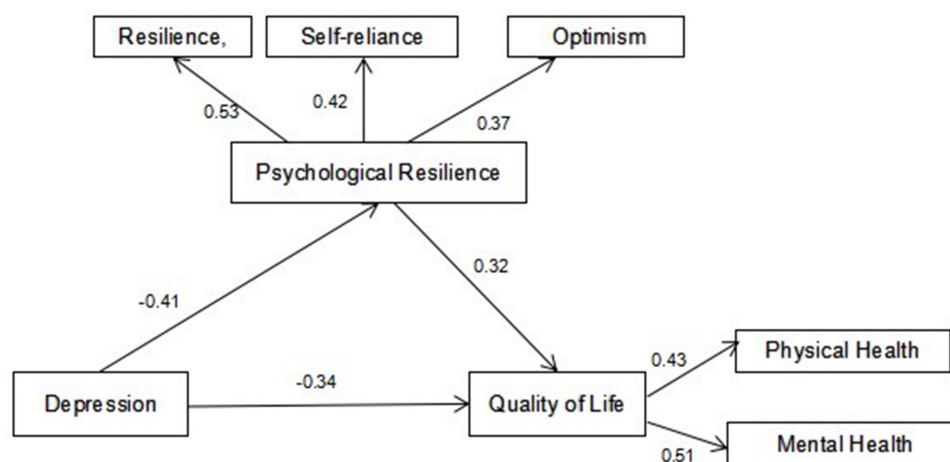
**Table 3** Correlation Analysis Between Depression, Psychological Resilience, and Quality of Life in These Maintenance Hemodialysis Patients (r Value)

Parameters	Depression	Psychological Resilience	Resilience	Self-Reliance	Optimism	Quality of Life	Physical Health	Mental Health
Depression	1.000							
Psychological Resilience	-0.456	1.000						
Resilience	-0.478	0.796	1.000					
Self-reliance	-0.546	0.679	0.712	1.000				
Optimism	-0.436	0.776	0.643	0.578	1.000			
Quality of Life	-0.453	0.578	0.725	0.251	0.649	1.000		
Physical Health	-0.384	0.721	0.462	0.376	0.589	0.386	1.000	
Mental Health	-0.296	0.437	0.513	0.279	0.752	0.596	0.531	1.000

Note: all  $p < 0.05$ .

## The Analysis of the Mediating Effect of Psychological Resilience Between Depression and Quality of Life in These MHD Patients

Using AMOS 21.0, a structural equation model was established with quality of life as the dependent variable, psychological resilience as a parallel mediating variable, and depression as the independent variable. The model was modified, fitted, and hypotheses were tested using the maximum likelihood method. The results of model fit indicated that  $\chi^2/df = 1.958$ , the root mean square error of approximation (RMSEA) = 0.071, goodness of fit index (GFI) = 0.964 ( $>0.9$ ), adjusted goodness of fit index (AGFI) = 0.912 ( $>0.9$ ), normed fit index (NFI) = 0.931 ( $>0.9$ ), incremental fit index (IFI) = 0.954 ( $>0.9$ ), and comparative fit index (CFI) = 0.964 ( $>0.9$ ). These values suggest that the model fits well, and all path coefficients are statistically significant ( $P < 0.05$ ), indicating the feasibility of testing for mediating effects. Initial fit indices showed that all fit indices were above acceptable levels. After model modification, no significant improvement in model fit was observed. Therefore, the structural equation model established in this analysis reached a stable level and no further model adjustments will be made. The structural equation model of the mediating effect of psychological resilience between depression and quality of life is shown in Figure 1. The model indicated that Psychological resilience played a mediating role in the relationship between depression and quality of life ( $\beta = -0.13$ ,  $P < 0.05$ ), with the mediating effect analysis showing a significant indirect effect of depression on quality of life. The direct and indirect effects of depression on quality of life were  $-0.34$  and  $-0.13$ , respectively, with a total effect of  $-0.47$ . The mediating effect accounted for 27.7% ( $-0.13 / -0.47$ ) \* 100%  $\approx 27.7\%$ ) of the total effect. Interactions between variables can be found in Table 4.



**Figure 1** Model of the mediating effect of psychological resilience in the relationship between depression and quality of life in these MHD patients.

**Table 4** Analysis of the Mediating Effect of Psychological Resilience Between Depression and Quality of Life in These Maintenance Hemodialysis Patients

Path	Effect Size	Standard Error	95% CI	Effect Size Ratio	P
Indirect Effect	-0.13	0.042	(-0.27,-0.09)	27.7%	<0.001
Direct Effect	-0.34	0.076	(-0.45,-0.18)	72.3%	0.014
Total Effect	-0.47	0.058	(-0.68,-0.21)	100%	0.003

## Discussion

ESRD has a high mortality rate, and hemodialysis is currently an effective treatment method in clinical practice for this disease. This method helps maintain electrolyte balance, acid-base balance, and overall kidney system balance in the body. However, during the process of hemodialysis, it inevitably disrupts the quality of life for patients.<sup>29</sup> In this study, the quality of life score was found to be  $59.48 \pm 9.30$ , indicating a below-average level, suggesting that there is room for improvement in the quality of life for these patients. The research confirms that the quality of life of patients is influenced by factors such as anxiety and depression, psychological resilience, social support, and the duration of the illness. This highlights the need for medical staff to pay close attention to the quality of life of such patients and provide targeted interventions based on these influencing factors. A study conducted by Togay et al revealed that the quality of life for individuals undergoing dialysis was notably subpar, and various demographic factors and disease-related data were found to have differing impacts on the quality of life of these patients.<sup>30</sup>

According to research, the risk of depression in MHD patients is four times higher than the general population.<sup>31</sup> The main contributing factors include inflammation and nutritional imbalances. The decline in kidney function during the ESRD stage leads to reduced ability to excrete inflammatory factors, resulting in prolonged high expression of inflammatory cytokines such as tumor necrosis factor alpha, interleukin-6, and interleukin-1.<sup>32</sup> Additionally, nutrient loss during dialysis accelerates muscle protein breakdown, increases metabolism, decreases synthesis, and most MHD patients suffer from malnutrition, which can lead to reduced activity and increased negative emotions.<sup>33</sup> Furthermore, MHD patients are prone to complications such as pain, fatigue, and sleep disorders, increasing the risk of depression.<sup>34</sup> Our study revealed that the mean total depression score of these MHD patients was  $9.37 \pm 4.60$ , indicating a moderate to low level of depression. A cross-sectional study conducted through interviews with patients at the dialysis unit of Jordan University Hospital revealed that 92.4% of the patients experienced symptoms of depression and the female patients exhibited significantly higher depression scores compared to their male counterparts.<sup>35</sup> Additionally, there was a positive correlation between age and depression scores among the patients.

Psychological resilience is the ability and capacity of an individual to cope with stress or pressure, playing a protective role in promoting the individual's mental health. ESRD is a challenging condition with various complications and a poor prognosis. Due to the physical limitations imposed by this disease, patients' psychological well-being is disrupted, leading to a decrease in their level of psychological resilience. The constraints of this illness impede the patients' ability to fulfill their responsibilities and obligations, necessitating care from family members. Consequently, feelings of guilt and helplessness significantly increase, giving rise to negative emotions, and causing a decline in their physical and mental health, ultimately leading to a noticeable reduction in their quality of life. This study determined that the overall psychological resilience score of the group of MHD patients was  $57.58 \pm 6.05$ , indicating a slightly below average level of resilience. A cross-sectional study conducted in China discovered that increased social support and family resilience, coupled with the passage of time, were associated with enhanced psychological resilience among these patients.<sup>36</sup> Their discovery underscores the critical importance of recognizing and utilizing social and familial support systems that can positively influence an individual's growth and development.

The results of this study indicate a significant negative correlation between depression and psychological resilience, and quality of life. The more pronounced the symptoms of depression, the lower the level of psychological resilience, leading to a decline in quality of life. Some researchers have pointed out that assessing a patient's depression symptoms can better reflect their quality of life compared to measuring clinical objective indicators.<sup>37</sup> The mediating role of psychological resilience in the relationship between depression and quality of life has been previously reported in international studies. For example, González-Flores CJ et al found that higher resilience was associated with better mental health outcomes in MHD patients.<sup>38</sup> Similarly, van Rijn MM et al reported that resilience moderated the impact of

depression on quality of life in MHD patients.<sup>39</sup> Besides, A study suggest that psychological interventions, specifically resilience training, can have a positive impact on the psychological well-being and quality of life of patients undergoing hemodialysis.<sup>40</sup> Effective management of depression is necessary in clinical work, conducting dynamic assessments of the causes and timing of depression occurrences can facilitate timely interventions. Additionally, poor psychological resilience in patients is associated with more severe depression, lower levels of quality of life.<sup>41</sup> The close association between psychological resilience and depression is consistent with previous research findings.<sup>42–44</sup> This suggests that healthcare professionals should prioritize the mental health of individuals with Mental Health Disorders, through conducting psychological workshops, encouraging patients to express their feelings, and organizing activities for emotional support among peers to help them cultivate a positive mindset and ultimately enhance their quality of life. Research has shown that improving psychological resilience contributes to an increase in the quality of life for MHD patients, indicating a positive correlation between psychological resilience and quality of life, which aligns with the conclusions of our study.<sup>45</sup>

The findings of this study suggest that psychological resilience partially mediates the relationship between depression and quality of life. Specifically, a decrease in psychological resilience among patients with mental health disorders increases the risk of depression and reduces quality of life. Therefore, healthcare providers should not only focus on improving patients' depression but also closely monitor their psychological resilience. By enhancing patients' psychological resilience, it is possible to partially reduce their levels of depression, maintain homeostasis, sustain good mental energy and quality of life. Stable and comprehensive family environments, economic conditions, and social support are key factors in improving psychological resilience. Therefore, nursing staff need to assess the ability of mental health disorder patients to cope with stress and adversity, and intervene promptly with effective measures such as mindfulness stress reduction and music therapy based on their psychological changes. This will help enhance their ability to adapt to changes and promote the recovery of their physical and mental health. By leveraging the resources around the patients and tapping into the support of their families and society, patients can clearly feel the understanding and support from their loved ones and the community.

Our research findings unveiled the significant moderating impact of psychological resilience on the connection between depression and quality of life. This study stands as a pioneering exploration into the role of psychological resilience as a moderator in the correlation between depression and quality of life among MHD individuals. A pertinent qualitative analysis demonstrated that engaging in physical activity post-adversity boosts psychological resilience as a protective element. Furthermore, numerous prior studies have delved into the shielding effects of psychological resilience on depressive symptoms across various demographic groups.<sup>46–48</sup> In alignment with the interaction model of psychological resilience, moderating factors can modify the impact of risk elements on psycho-social well-being. Within this investigation, robust psychological resilience exhibited a dampening effect on the depression-quality of life relationship. Conversely, in the low psychological resilience cohort, depression displayed a negative association with quality of life. These outcomes underscore the importance of interventions targeting psychological resilience to bolster its protective prowess against the deleterious impacts of depression on the quality of life in MHD patients.

The similarities in our findings with international studies may be due to the universal challenges faced by MHD patients. However, differences may arise from variations in healthcare systems, cultural contexts, and the specific measures used to assess resilience and quality of life. Kang et al reported higher resilience scores in South Korea, attributing this to cultural differences in the perception of and response to adversity.

We acknowledge that our study has limitations due to the inclusion of only a subset of demographical data, which may not fully capture the complexity of the factors influencing depression and quality of life in MHD patients. Future research should aim to include a more comprehensive set of variables to provide a more nuanced understanding of these relationships.

This study is constrained by its cross-sectional design and reliance on convenience sampling. The participants were exclusively recruited from a single location, potentially limiting the sample size and the generalizability of the findings. Future research should aim to further validate the results in different regions and populations. In future studies, it is recommended to utilize longitudinal data in order to enhance understanding of the causal direction. Additionally, similar to prior research, this study relied on self-reporting which may introduce recall bias. Therefore, conducting further experimental research with improved methods for psychological resilience, as well as depression and quality of life, is necessary.



## Conclusions

In light of our findings, we conclude that among maintenance hemodialysis (MHD) patients, depression is prevalent and significantly impacts their quality of life. Psychological resilience was identified as a mediator in the relationship between depression and quality of life, with a significant indirect effect of depression on quality of life through resilience ( $\beta=-0.13$ ,  $P<0.05$ ). The direct effect of depression on quality of life was also significant ( $\beta=-0.34$ ,  $P<0.05$ ), accounting for 72.3% of the total effect, while the mediating effect of psychological resilience accounted for 27.7% of the total effect. These results underscore the importance of addressing depression and enhancing psychological resilience in MHD patients to improve their quality of life. Future research should explore additional potential mediators to further understand the complex relationship between depression, psychological resilience, and quality of life in MHD patients.<sup>42–44</sup>

## Abbreviation

MHD, maintenance hemodialysis; ESRD, end-stage renal disease; PHQ-9, Patient Health Questionnaire; DSM-V, Diagnostic and Statistical Manual of Mental Disorders; CD-RISC, Connor-Davidson Resilience Scale.

## Data Sharing Statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

## Ethics Approval and Consent to Participate

The study has been approved by the Ethics Committee of Baoding No.1 Central Hospital (Ethics number: 2023052), and adhered strictly to the guidelines and principles outlined in the Declaration of Helsinki. The participants were informed that the data will be anonymized.

## Consent for Publication

Written informed consent was obtained from the patients for publication of this study.

## Acknowledgment

The author acknowledges the contributions of the colleagues in Baoding No 1 Central Hospital that aided the efforts.

## Funding

This research was supported by Baoding Science and Technology Plan Self-financing Project.

## Disclosure

The author declares there are no competing interests.

## References

1. Greenberg KI, Choi MJ. Hemodialysis Emergencies: core Curriculum 2021. *Am J Kidney Dis.* 2021;77(5):796–809. doi:10.1053/j.ajkd.2020.11.024
2. Liu S, Wang Y, He X, et al. Factors affecting suboptimal maturation of autogenous arteriovenous fistula in elderly patients with diabetes: a narrative review. *Heliyon.* 2024;10(15):e35766. doi:10.1016/j.heliyon.2024.e35766
3. Kubanek A, Renke M, Godlewska BR, et al. Screening for depression in chronic haemodialysis patients as a part of care in dialysis setting: a cross-sectional study. *Front Psychiatry.* 2024;15:1410252. doi:10.3389/fpsy.2024.1410252
4. Wang G, Zhuo N, Liu Z. Anxiety and depression among patients with end-stage renal disease undergoing hemodialysis. *Int Urol Nephrol.* 2024;56(7):2449–2450. doi:10.1007/s11255-024-03979-w
5. Tian N, Chen N, Li PK. Depression in dialysis. *Curr Opin Nephrol Hypertens.* 2021;30(6):600–612. doi:10.1097/MNH.0000000000000741
6. Xia NN, Pan KC, Liu J, Ji D. The Mediating Effect of Symptom Burden in the Depression and Quality of Life in Patients with Maintenance Hemodialysis. *Psychol Res Behav Manag.* 2024;17:2739–2746. doi:10.2147/PRBM.S465215
7. Huang CW, Wee PH, Low LL, et al. Prevalence and risk factors for elevated anxiety symptoms and anxiety disorders in chronic kidney disease: a systematic review and meta-analysis. *Gen Hosp Psychiatry.* 2021;69:27–40. doi:10.1016/j.genhosppsy.2020.12.003
8. Mosleh H, Alenezi M, Al Johani S, et al. Prevalence and Factors of Anxiety and Depression in Chronic Kidney Disease Patients Undergoing Hemodialysis: a Cross-sectional Single-Center Study in Saudi Arabia. *Cureus.* 2020;12(1):e6668. doi:10.7759/cureus.6668

9. Farrokhi F, Abedi N, Beyene J, et al. Association between depression and mortality in patients receiving long-term dialysis: a systematic review and meta-analysis. *Am J Kidney Dis.* 2014;63(4):623–635. doi:10.1053/j.ajkd.2013.08.024
10. Lu Y, Zhai S, Liu Q, et al. Correlates of symptom burden in renal dialysis patients: a systematic review and meta-analysis. *Ren Fail.* 2024;46(2):2382314. doi:10.1080/0886022X.2024.2382314
11. Alkubati SA, Al-Sayaghi KM, Salameh B, et al. Prevalence of Depression and Its Associated Factors Among Hemodialysis Patients in Hodeida City, Yemen. *J Multidiscip Healthc.* 2024;17:689–699. doi:10.2147/JMDH.S452935
12. Chan GC-K, Ng JK-C, Chow K-M, et al. Depression does not predict clinical outcome of Chinese peritoneal Dialysis patients after adjusting for the degree of frailty. *BMC Nephrol.* 2020;21(1):329. doi:10.1186/s12882-020-01994-4
13. Al-Jabi SW, Sous A, Jorf F, et al. Depression among end-stage renal disease patients undergoing hemodialysis: a cross-sectional study from Palestine. *Ren Replace Ther.* 2021;7(1):12. doi:10.1186/s41100-021-00331-1
14. Meng Y, Wu HT, Niu JL, et al. Prevalence of depression and anxiety and their predictors among patients undergoing maintenance hemodialysis in Northern China: a cross-sectional study. *Ren Fail.* 2022;44(1):933–944. doi:10.1080/0886022X.2022.2077761
15. He R, Tung TH, Liu T, et al. A Meta-analysis on the Relationship between Different Dialysis Modalities and Depression in End-stage Renal Disease Patients. *Curr Pharm Des.* 2021;27(40):4171–4178. doi:10.2174/1381612827666210521132737
16. So S, Brown MA, Li K. Factors associated with quality of life in patients with kidney failure managed conservatively and with dialysis: a cross-sectional study. *BMC Nephrol.* 2023;24(1):322. doi:10.1186/s12882-023-03355-3
17. Aizpurua-Perez I, Arregi A, Labaka A, et al. Psychological resilience and cortisol levels in adults: a systematic review. *Am J Hum Biol.* 2023;35(12):e23954. doi:10.1002/ajhb.23954
18. Smeeth D, Beck S, Karam EG, et al. The role of epigenetics in psychological resilience. *Lancet Psychiatry.* 2021;8(7):620–629. doi:10.1016/S2215-0366(20)30515-0
19. Imran A, Tariq S, Kapczynski F, et al. Psychological resilience and mood disorders: a systematic review and meta-analysis. *Trends Psychiatry Psychother.* 2024;46:e20220524. doi:10.47626/2237-6089-2022-0524
20. Kelley AS, Bollens-Lund E. Identifying the Population with Serious Illness: the “Denominator”. *Challenge J Palliat Med.* 2018;21(S2):S7–S16. doi:10.1089/jpm.2017.0548
21. Bonett DG, Wright TA. Sample Size Requirements for Estimating Pearson, Kendall and Spearman Correlations. *Psychometrika.* 2000;65(1):23–28. doi:10.1007/BF02294183
22. Associazione Medica Mondiale (AMM). dichiarazione di Helsinki. Principi etici per la ricerca medica che coinvolge soggetti umani [World Medical Association (AMM). Helsinki Declaration. Ethical principles for medical research involving human subjects]. *Assist Inferm Ric.* 2001;20(2):104–107.
23. Costantini L, Pasquarella C, Odone A, et al. Screening for depression in primary care with Patient Health Questionnaire-9 (PHQ-9): a systematic review. *J Affect Disord.* 2021;279:473–483. doi:10.1016/j.jad.2020.09.131
24. Heritage B, Al Asadi AA, Hegney DG. Examination of the Connor-Davidson Resilience Scale 10 (CD-RISC-10) using the polytomous Rasch model. *Psychol Assess.* 2021;33(7):672–684. doi:10.1037/pas0001011
25. Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety.* 2003;18(2):76–82. doi:10.1002/da.10113
26. Campbell-Sills L, Stein MB. Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): validation of a 10-item measure of resilience. *J Trauma Stress.* 2007;20(6):1019–1028. doi:10.1002/jts.20271
27. Perpiñá-Galvañ J, Orts-Beneito N, Fernández-Alcántara M, et al. Level of Burden and Health-Related Quality of Life in Caregivers of Palliative Care Patients. *Int J Environ Res Public Health.* 2019;16(23):4806. doi:10.3390/ijerph16234806
28. Lam CL, Tse EY, Gandek B. Is the standard SF-12 health survey valid and equivalent for a Chinese population? *Qual Life Res.* 2005;14(2):539–547. doi:10.1007/s11136-004-0704-3
29. Bossola M, Hedayati SS, Brys ADH, et al. Fatigue in Patients Receiving Maintenance Hemodialysis: a Review. *Am J Kidney Dis.* 2023;82(4):464–480. doi:10.1053/j.ajkd.2023.02.008
30. Togay E, Hø A. Examinations of effects of socio-demographic features and disease-related data of patients with hemodialysis on the quality of life. *Sci Rep.* 2023;13(1):16536. doi:10.1038/s41598-023-43473-4
31. Bademci MS, Bayraktar FA, Oztekin A, et al. Prevalence of depression in hemodialysis patients due to renal insufficiency. *Vascular.* 2022;30(1):187. doi:10.1177/1708538121996582
32. Al Naamani Z, Gormley K, Noble H, et al. Fatigue, anxiety, depression and sleep quality in patients undergoing haemodialysis. *BMC Nephrol.* 2021;22(1):157. doi:10.1186/s12882-021-02349-3
33. Shirazian S. Depression in patients undergoing hemodialysis: time to treat. *Kidney Int.* 2019;96(6):1264–1266. doi:10.1016/j.kint.2019.05.017
34. Nagy E, Tharwat S, Elsayed AM, et al. Anxiety and depression in maintenance hemodialysis patients: prevalence and their effects on health-related quality of life. *Int Urol Nephrol.* 2023;55(11):2905–2914. doi:10.1007/s11255-023-03556-7
35. Alshelleh S, Alhawari H, Alhourri A, et al. Level of Depression and Anxiety on Quality of Life Among Patients Undergoing Hemodialysis. *Int J Gen Med.* 2023;16:1783–1795. doi:10.2147/IJGM.S406535
36. Wang Y, Qiu Y, Ren L, et al. Social support, family resilience and psychological resilience among maintenance hemodialysis patients: a longitudinal study. *BMC Psychiatry.* 2024;24(1):76. doi:10.1186/s12888-024-05526-4
37. Vittengl JR, Jha MK, Minhajuddin A, et al. Quality of life after response to acute-phase cognitive therapy for recurrent depression. *J Affect Disord.* 2021;278:218–225. doi:10.1016/j.jad.2020.09.059
38. González-Flores CJ, Garcia-García G, Lerma C, et al. Effect of Cognitive Behavioral Intervention Combined with the Resilience Model to Decrease Depression and Anxiety Symptoms and Increase the Quality of Life in ESRD Patients Treated with Hemodialysis. *Int J Environ Res Public Health.* 2023;20(11):5981. doi:10.3390/ijerph20115981
39. van Rijn MM, Jaarsma T, de Man-van Ginkel JM, Weldam SWM. Association Between Self-care and Resilience: a Cross-sectional Study in Heart Failure Patients. *J Cardiovasc Nurs.* 2023;38(2):E70–E77. doi:10.1097/JCN.0000000000000908
40. Amirkhani M, Shokrpour N, Bazrafcan L, et al. The Effect of Resilience Training on Stress, Anxiety, Depression, and Quality of Life of Hemodialysis Patients: a Randomized Controlled Clinical Trial. *Iran J Psychiatr Behav Sci.* 2021;15:104490. doi:10.5812/ijpbs.104490

41. Ejder ZB, Sanlier N. The relationship between loneliness, psychological resilience, quality of life and taste change in cancer patients receiving chemotherapy. *Support Care Cancer*. 2023;31(12):683. doi:10.1007/s00520-023-08156-w
42. Sun Y, Song B, Zhen C, et al. The mediating effect of psychological resilience between social support and anxiety/depression in people living with HIV/AIDS-A study from China. *BMC Public Health*. 2023;23(1):2461. doi:10.1186/s12889-023-17403-y
43. Li H, Zhao J, Chen R, et al. The relationships of preventive behaviors and psychological resilience with depression, anxiety, and stress among university students during the COVID-19 pandemic: a two-wave longitudinal study in Shandong Province, China. *Front Public Health*. 2023;11:1078744. doi:10.3389/fpubh.2023.1078744
44. Xu J, Zhang L, Sun H, et al. Psychological resilience and quality of life among middle-aged and older adults hospitalized with chronic diseases: multiple mediating effects through sleep quality and depression. *BMC Geriatr*. 2023;23(1):752. doi:10.1186/s12877-023-04473-1
45. Şanlı ME, Dinç M, Öner U, et al. The Role of Spirituality in Anxiety and Psychological Resilience of Hemodialysis Patients in Turkey. *J Relig Health*. 2023;62(6):4297–4315. doi:10.1007/s10943-023-01855-y
46. Ran L, Wang W, Ai M, et al. Psychological resilience, depression, anxiety, and somatization symptoms in response to COVID-19: a study of the general population in China at the peak of its epidemic. *Soc Sci Med*. 2020;262:113261. doi:10.1016/j.socscimed.2020.113261
47. Wojujutari AK, Idemudia ES, Ugwu LE. Psychological resilience mediates the relationship between diabetes distress and depression among persons with diabetes in a multi-group analysis. *Sci Rep*. 2024;14(1):6510. doi:10.1038/s41598-024-57212-w
48. Turan N, Canbulat Ş. The effectiveness of the training program on accepting and expressing emotions on the psychological resilience and depression levels of nurses: a two-year follow-up study. *Arch Psychiatr Nurs*. 2023;44:1–7. doi:10.1016/j.apnu.2023.03.002

International Journal of General Medicine

Dovepress

## Publish your work in this journal

The International Journal of General Medicine is an international, peer-reviewed open-access journal that focuses on general and internal medicine, pathogenesis, epidemiology, diagnosis, monitoring and treatment protocols. The journal is characterized by the rapid reporting of reviews, original research and clinical studies across all disease areas. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/international-journal-of-general-medicine-journal>