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Mediating effect of coping strategy and psychological status between illness perception and quality of life among patients with atrial fibrillation: a cross-sectional study

Zheng Minjie¹, Xie Zhijuan¹, Shi Xinxin¹ and Qu Shan^{1*}

Abstract

Background This study investigated the mediating effects of coping strategies and psychological status on the relationship between illness perception and health-related quality of life (HRQoL) among patients with atrial fibrillation (AF).

Methods This cross-sectional study enrolled 178 patients with AF who were admitted to a tertiary hospital in Beijing City in mainland from March 2020 and June 2022. Assessments were made for HRQoL using the Short Form Health Survey depressive symptoms using the Patient Health Questionnaire-9, anxiety using the Generalized Anxiety Disorder-7 (GAD-7), illness perception using the Brief Illness Perception Questionnaire (BIPQ), AF symptoms using the Atrial Fibrillation Severity Scale (AFSS), and coping strategies using the Brief-COPE Scale.

Results Significant correlations were observed between illness perception, emotional variables, coping strategies, and HRQoL scores. The regression analysis found that BIPQ, GAD, Maladaptive coping and Problem-focused coping are significant predictors of PCS ($F = 20.906$, $R^2 = 0.326$, $p < 0.01$) and MCS ($F = 31.24$, $R^2 = 0.419$, $p < 0.01$). Bootstrap samples were used to conduct mediation analysis. The indirect effects of GAD-7 and Problem-focused coping (PC) on the impact of BIPQ on QoL were significant. GAD accounted for 13.2–19.3% of the variance in the total effect across different models, while PC accounted for 22.1–25.8%. The results also indicated a significant chain effect in the illness perceptioing-anxiety-coping style-QoL model, which can explain 4.3–10.2% of the total effect, respectively.

Conclusions The perception of illness significantly influenced HRQoL in patients with AF, as mediated by emotional symptoms and coping strategies. This highlights the importance of anxiety and problem-focused coping mechanisms. These findings underscore the need for a holistic, patient-centered approach to AF management that incorporates emotional well-being and coping strategies.

Trial registration Retrospectively registered with [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT05974098) (NCT05974098). The date of registration: 1 August 2023.

Keywords Atrial fibrillation, Illness perception, Quality of life, Coping strategies, Psychological status

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Background

Atrial fibrillation (AF) is the most prevalent type of cardiac arrhythmia, conferring a substantial increase in the risk of mortality, stroke, congestive heart failure, cognitive decline, and dementia, thereby exerting a profound detrimental impact on the quality of life (QoL) of affected individuals. The prevalence of AF among the adult Chinese population ranges from 0.72 to 1.6%, with a notable increase in incidence with advancing age [1, 2]. As the demographic shift towards an aging population progresses, the aggregate number of individuals afflicted with this condition is anticipated to increase progressively.

Health-related quality of life (HRQoL)

HRQoL is conceptualized as an individual's subjective appraisal of their life state in relation to their personal aspirations or expectations [3]. Post-intervention, although patients with AF may exhibit significant improvements in disease symptoms and cardiac functionality, it remains evident that extra-cardiac factors continue to affect their QoL negatively. Consequently, the HRQoL assessment has emerged as a pivotal referential metric for evaluating the holistic health status of patients with AF. Current scientific reports indicate that a constellation of factors, including illness perception, psychological attributes, and symptom burden, along with the presence of physical comorbidities, synergistically influence the HRQoL of individuals with AF [4, 5]. However, the interrelationships among these influencing factors remain unclear.

Emotional well-being

Individuals with AF often experience heightened anxiety and depression [6, 7], which are linked to concerns about the severe consequences of the disease, such as stroke, and the adverse effects of AF symptoms on their overall HRQoL and functional capabilities. The post-diagnosis unique challenges patients experience include delayed diagnosis, a sense of isolation, disillusionment due to recurrent treatment setbacks, and the unpredictability of symptomatic episodes, which further impair their emotional well-being [8, 9]. Additionally, sympathetic nervous system overactivity increases the likelihood of AF episodes [10]. Consequently, the presence of anxiety and depressive symptoms is recognized as a significant factor affecting the HRQoL in patients with AF.

Illness perception and coping strategy

Educational demands concerning the management of AF remain unmet, with patients potentially gravitating towards the allure of unverified methodologies that proliferate on the internet [11]. This trend may potentially have adverse effects on their QoL. A limited

understanding of AF or the inability to effectively manage the condition can trigger a pernicious cycle characterized by persistent avoidance or engagement in extreme behaviors, leading to withdrawal from activities that were once sources of enjoyment [12]. Patient adherence to medical regimens is significantly influenced by their beliefs about health and attitudes toward medication. Notably, providing structured support to patients is paramount to augment the safety and efficacy of anticoagulation therapies [13, 14].

Hypothesis

The Common Sense Model (CSM), introduced by Leventhal, Meyer, and Gerber, highlights the importance of an individual's subjective interpretations of health-related information and the emotional responses that guide health behavior decision-making [15]. According to CSM, perceptions of illness can trigger emotional reactions and influence the adoption of coping strategies, which subsequently shape health outcomes. In light of this model, the present study aimed to substantiate the notion that, in the context of AF, the degree of illness perception can influence HRQoL by mediating the effects of emotional symptoms and coping strategies.

Methods

Study design

This cross-sectional study was conducted among patients with AF at the Department of Cardiology and Medical Psychology of a comprehensive tertiary hospital in Beijing, China from March 2020 to June 2022. Participants were predominantly recruited through research posters and referrals by specialists in cardiology. The patients were invited to participate voluntarily and they all provided written informed consent.

The study was approved by the regional ethics review board of Peking University (approval number: 2020PHB151). The research was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines and the findings were reported following the STROBE checklist. This study was performed following the Declaration of Helsinki.

Participants and sample size

The inclusion criteria for the study were as follows: (1) aged between 18 and 75 years; (2) a diagnosis of AF according to the 2020 European Society of Cardiology Guidelines for Atrial Fibrillation [16], confirmed from formal medical records, a 12-lead ECG, or a Holter monitor report, and verified by a cardiologist; and (3) proficiency in reading and writing in Chinese.

The exclusion criteria comprised: (1) unstable coronary artery disease; (2) severe left ventricular systolic

dysfunction with heart failure (ejection fraction $\leq 35\%$); (3) recent thoracic surgery; (4) terminal illnesses, including malignant diseases with a 1-year survival rate; (5) psychiatric conditions with daily functioning impairments, such as schizophrenia and delusions; (6) cognitive impairment that impedes involvement in the study. An a priori power analysis conducted using G*Power (version 3.1) with an effect size of 0.3, an error probability (alpha) of 0.05, and a power of 0.95 determined the required sample size to predict QoL with eight predictor variables. This threshold was met and exceeded 134 participants.

Outcomes and measurements

12-Item short Form Health Survey (SF-12)

HRQoL was assessed with the SF-12, a 12-item instrument derived from the longer SF-36. The SF-12 evaluates two primary domains: the physical component summary (PCS) and the mental component summary (MCS), both scored on a scale from 0 to 100; higher scores indicate superior health status [17].

PHQ-9

To evaluate depressive symptoms experienced in the last fortnight, we utilized the Patient Health Questionnaire-9 (PHQ-9), which has a scoring range of 0 to 27 [18]. The choice of the PHQ-9 was influenced by its simple application process and recognized efficacy, which surpasses those of structured interviews, as outlined in the Diagnostic and Statistical Manual of Mental Disorders IV [19]. The Chinese adaptation of the PHQ-9 exhibited an internal consistency of 0.82, and its test-retest reliability was reported at 0.76 [20].

Generalized anxiety disorder-7 (GAD-7)

The GAD-7, a scale comprising seven items, evaluates the presence and severity of anxiety symptoms through responses to a four-point Likert scale. Total GAD-7 scores ranged from 0 to 21. The GAD-7 demonstrated strong internal consistency, with a Cronbach's alpha of 0.92. Additionally, its stability over time was confirmed, with a test-retest intraclass correlation coefficient of 0.83 [21]. Owing to its dependable diagnostic accuracy and proven validity, the GAD-7 has become widely recognized and utilized in clinical settings as well as in research.

Brief illness perception questionnaire (BIPQ)

The BIPQ, a nine-item instrument, was employed to assess patient perceptions of their illness across nine dimensions. The BIPQ yields a composite score that quantifies the psychological impact of illness, with higher scores reflecting greater illness burden. This aggregate score is derived from summing the individual item scores, with items 3, 4, and 7 being reverse-scored. The

total score potential spans from 0 to 80, where higher scores suggest a more substantial negative perception of the disease [22]. The Chinese adaptation of the BIPQ demonstrated favorable psychometric properties, with a Cronbach's alpha of 0.78 [23].

University of Toronto atrial fibrillation severity scale (AFSS)

The AFSS is a condition-specific instrument divided into three sections. To evaluate AF symptoms, we selected the symptomatic component from the third section, which included seven prevalent symptoms: heart palpitations, rest-related shortness of breath, activity-induced shortness of breath, exercise intolerance, dizziness, resting fatigue, and chest discomfort. This component of the AFSS quantifies symptom severity using a 6-point scale, with each symptom scored from 0 to 5. The aggregate score for this scale ranges from 0 to 35, with higher scores reflecting greater severity of AF symptoms. The scale exhibits good internal consistency, with Cronbach's α values of 0.67 for healthcare usage, 0.94 for the burden of AF, and 0.72 for the severity of AF. The test-retest reliability over 3 months was moderate to strong, with correlation coefficients of 0.71 for healthcare usage, 0.75 for AF burden, and 0.64 for AF severity [24].

Carver brief coping questionnaire (Brief-COPE scale)

The Brief-COPE includes 28 items that measure 14 conceptually differentiable coping reactions [25]. The Brief-COPE questionnaire consists of three subscales. The maladaptive coping (MC) scale is based on 12 items (self-distraction, denial, substance use, behavioral disengagement, venting, self-blame) and has good internal consistency ($\alpha=0.71$). The Emotion-Focused Coping scale is based on 10 items (emotional support, positive reframing, humor, acceptance, religion) and also has good internal consistency ($\alpha=0.74$). Lastly, the Problem-Focused Coping scale is based on six items (active coping, instrumental support, planning) and demonstrates good internal consistency ($\alpha=0.85$). A 4-point rating scale was used, for example: "1 [I have not been doing this at all] to 3 [I have been doing this a lot]." The scores for these three subscales were calculated as the averages of the respective item scores.

Data collection

Patients with AF provided details regarding their age, sex, marital status, insurance status, educational level, and employment status. Data collection was completed using a paper-and-pencil survey with administrative staff available to answer the relevant questions. Clinical information was also retrieved from patient medical records.

Table 1 Sociodemographic and clinical characteristics of patients with AF (N = 187)

Variables	N	%
Sex		
Male	81	45.5
Female	97	54.5
Marital status		
Single	10	5.6
Married	139	78.1
Divorced	24	13.5
Widowed	5	2.8
Monthly income(¥)		
<5000	58	32.6
5000~10,000	74	41.6
>10,000	46	25.8
Medical insurance		
No	45	25.3
Yes	133	74.7
Employment status		
Employed	32	18.0
Unemployed	22	12.4
Retired	124	69.7
Education		
Elementary school	22	12.4
High school	66	37.1
College/university	90	50.6
Comorbidity		
No	95	53.4
Yes	83	46.6
Type of AF		
Permanent	47	26.4
Paroxysmal	90	50.6
Persistent	41	23.0

AF, atrial fibrillation

Data analyses

We employed SPSS, version 26 (IBM Corp., Armonk, NY, USA), for all statistics analyses. Sociodemographic data were described as mean \pm SD for normally distributed data; otherwise, we used median (interquartile range [IQR]). We analyzed categorical data using the chi-square test or Fisher's exact test. Spearman's correlation coefficient was used to assess the correlation between the variables. Alongside the descriptive analysis of the psychometric instruments, multiple linear regression models were used. Prior to conducting the analysis, we assessed the assumptions of linear regression, such as verifying independence using the Durbin-Watson test and checking for multicollinearity using the variance inflation factor (VIF) (all VIF values were <2). To enhance the reliability of our findings, we employed the bootstrap function from the boot package, applying the bootstrapping method with 5000 resamples to estimate the coefficient distribution, assess coefficient bias and standard error, and evaluate the mediator models. Model 6 was selected

Table 2 Scores of illness perception, coping strategy, psychological, AF symptoms, and quality of life

	Mean/Median	SD /IQR
BIPQ	46	9
Consequences	5	2
Timeline	6	4
Personal control	6	2
Treatment control	5	3
Identity	5	3
Illness concern	7	3
Understanding	7	2
Emotional response	5	2
Brief-COPE		
Maladaptive coping	1.42	0.50
Emotion-focused coping	1.90	0.30
Problem-focused coping	2.50	0.66
GAD-7	6	8
PHQ-9	11	10
AFSS symptoms scales	13	5
AFSS burden scales	11	8
SF-12 PCS	37.389	7.247
SF-12 MCS	38.643	6.607

AF, atrial fibrillation; AFSS, Atrial Fibrillation Severity Scale; BIPQ, Brief Illness Perception Questionnaire; GAD-7, Generalized Anxiety Disorder-7; IQR, interquartile range; MCS, mental component summary; PCS, physical component summary; PHQ-9, Patient Health Questionnaire-9; SD, standard deviation; SF-12: 12-Item Short Form Health Survey

for the mediation analysis to investigate the sequential mediation effects between the two mediator variables. The mediation effect was considered statistically significant if the confidence intervals of the bootstrap method did not span zero. The mediation analysis was conducted using the PROCESS macro (version 4.1) in SPSS.

Results

Demographics

We enrolled 178 patients with AF (97 females and 81 males). The mean patient age was 66 years (IQR 7 years). The majority of the participants were married (78.1%) and had insurance (74.4%) (Table 1). Outcomes of illness perception, coping strategies, psychological status, AF symptoms, and QoL are presented in Table 2.

Correlations between variables

Our results indicated a significant correlation between illness cognition, emotional variables, and coping strategies with QoL scores. Specifically, BIPQ, MC, GAD-7, AFSS symptom subscale scores, and AFSS burden subscale scores were negatively correlated with PCS scores. Conversely, emotion-focused coping and problem-focused coping were positively correlated with PCS scores. Similarly, BIPQ, MC, GAD-7, AFSS symptom subscale, and AFSS burden subscale scores were negatively correlated with MCS, while problem-focused coping (PC) was positively correlated with MCS scores (Table 3).

Table 3 Spearman correlation between variables

	1	2	3	4	5	6	7	8	9	10
1. BIPQ	1									
2. Maladaptive coping	0.015	1								
3. Emotion-focused coping	0.032	-0.168*	1							
4. Problem-focused coping	-0.196**	-0.386**	0.332**	1						
5. GAD-7	0.217**	0.117	-0.219**	-0.310**	1					
6. PHQ-9	0.030	0.046	-0.075	-0.129	0.412**	1				
7. AFSS symptoms scales	-0.115	0.599**	-0.137	-0.269**	0.081	-0.004	1			
8. AFSS burden scales	-0.174*	0.658**	-0.060	-0.199**	-0.069	-0.108	0.731**	1		
9. SF-12 PCS	-0.271**	-0.323**	0.164*	0.414**	-0.343**	-0.224**	-0.258**	-0.195**	1	
10. SF-12 MCS	-0.291**	-0.430**	0.061	0.498**	-0.360**	-0.099	-0.332**	-0.229**	0.289**	1

Significance * $p < 0.05$, ** $p < 0.01$; **: $p < 0.01$; *: $p < 0.05$

AFSS, Atrial Fibrillation Severity Scale; BIPQ, Brief Illness Perception Questionnaire; GAD-7, Generalized Anxiety Disorder-7; MCS, mental component summary; PCS, physical component summary; PHQ-9, Patient Health Questionnaire-9; SD, standard deviation; SF-12: 12-Item Short Form Health Survey

Table 4 Multiple linear regression to identify predictors for the PCS and MCS of the SF-12

Outcome	Predictors	B	Std. Error	Beta	t	p
PCS	BIPQ	-0.179	0.062	-0.190	-2.887	0.004
	Maladaptive coping	-4.422	1.553	-0.202	-2.848	0.005
	Problem-focused coping	4.284	1.191	0.273	3.597	<0.001
	GAD7	-0.264	0.109	-0.165	-2.425	0.016
MCS	BIPQ	-0.149	0.052	-0.174	-2.837	0.005
	Maladaptive coping	-5.868	1.314	-0.293	-4.467	<0.001
	Problem-focused coping	4.110	1.008	0.287	4.078	<0.001
	GAD-7	-0.263	0.092	-0.180	-2.857	0.005

BIPQ, Brief Illness Perception Questionnaire; GAD-7, Generalized Anxiety Disorder-7; MCS, mental component summary; PCS, physical component summary; SF-12: 12-Item Short Form Health Survey; Std, standard

Mediation effect analysis

Sociodemographic factors (age, sex, marital status, and income), clinical conditions (including comorbidities and type of AF), and observational variables were all considered potential influencing factors in the regression equation and analyzed using the stepwise method. Regression analysis revealed that BIPQ, GAD, MC, and problem-focused coping were significant predictors of PCS ($F=20.906$, $R^2=0.326$, $p < 0.01$) and MCS ($F=31.24$, $R^2=0.419$, $p < 0.01$) (Table 4).

Mediation analyses with 5000 bootstrap samples were conducted to examine the potential roles of GAD, MC, and PC as mediators between illness perception and QoL. Upon conducting a rigorous analysis, we observed that both the direct and indirect effects were significant in the Model BIPQ-GAD-QoL and BIPQ-PC-QoL. However, the sequential mediation effect was significant only in the BIPQ-GAD-PC-QoL model. Conversely, the mediating effect of the BIPQ-GAD-MC-QoL model was not statistically significant. (Fig. 1; Table 5).

Discussion

This study investigated the potential mediating and moderating roles of emotional symptoms and coping mechanisms among individuals with AF in relation to their illness perception and QoL. The findings demonstrated

a significant negative correlation between distorted illness perceptions and QoL. Furthermore, the findings identified anxiety symptoms and coping strategies as pivotal mediators in the interplay between cognitive and emotional biases and QoL, thereby confirming the sequential process that unfolds from disease perception to emotional and behavioral responses to the ultimate evaluation of one's QoL. Within this complex process, the mediating effects of anxiety symptoms and the use of various coping strategies have shown a range of influential effects.

Illness perceptions have been shown to directly affect disease-related QoL [26]. This correlation is not limited to cardiovascular diseases; it extends to various other chronic medical conditions, including cancer, diabetes mellitus, and inflammatory bowel disease [27–29]. The chronic disease transition perspective model proposed by Paterson suggests that subjective perceptions of reality rather than objective measures form the basis of how patients with chronic conditions interpret and manage their health challenges [30]. This highlights the importance of a robust interdisciplinary approach in which close collaboration between psychiatry and cardiology is crucial for establishing a comprehensive and long-term approach to managing cardiac patients throughout the chronic phase of their illness.

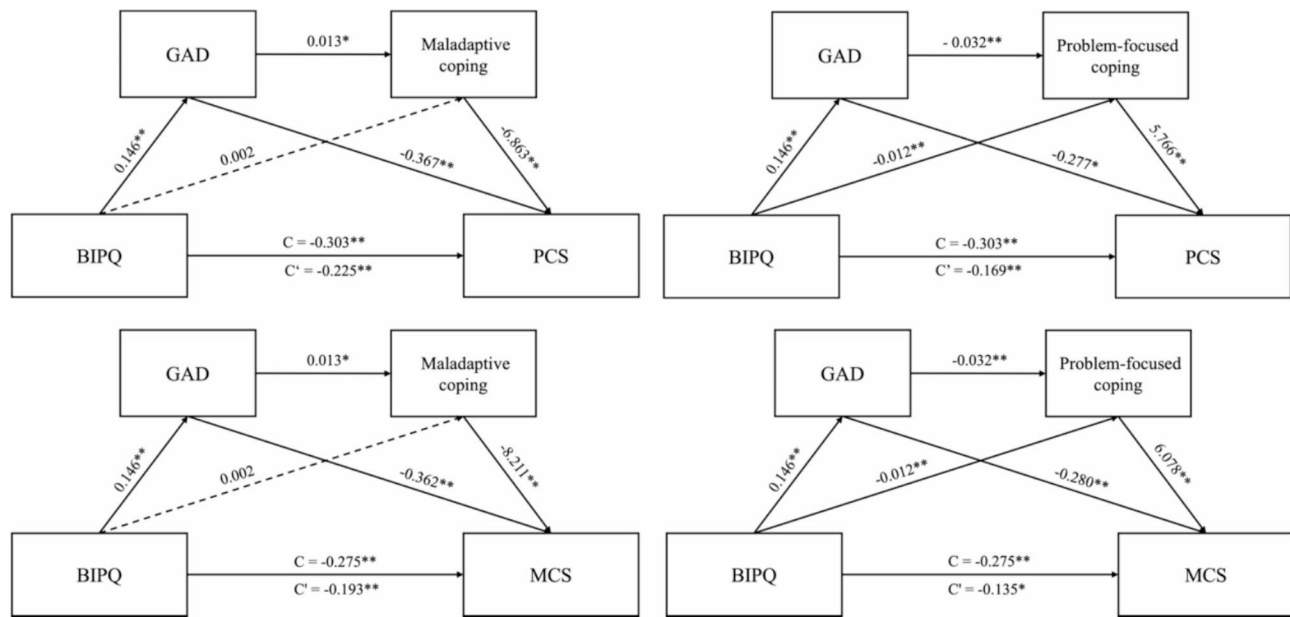


Fig. 1 Chain mediating effect of generalized anxiety disorder (GAD) and coping strategies. Nonstandardized coefficients are reported, and dashed lines represent statistical insignificance. * $p < 0.05$ and ** $p < 0.01$. C indicates total effect; C' indicates direct effect

Table 5 Indirect and chain effect of perception emotion coping strategy QoL model

Model	Effect	Boot SE	Boot LLCI	Boot ULCI	Ratio of indirect to total effect	Ratio of indirect to total effect
Total indirect effects	-0.079	0.041	-0.167	-0.007	26.1%	
BIPQ-GAD-PCS	-0.054	0.024	0.108	0.014		17.8%
BIPQ-MC-PCS	-0.011	0.023	-0.062	0.032		-
BIPQ-GAD-MC-PCS	-0.013	0.009	-0.035	-0.001		4.3%
Total indirect effects	-0.135	0.047	-0.233	-0.051	44.6%	
BIPQ-GAD-PCS	-0.040	0.023	-0.093	-0.005		13.2%
BIPQ-PC-PCS	-0.067	0.030	-0.133	-0.014		22.1%
BIPQ-GAD-PC-PCS	-0.027	0.013	-0.056	-0.007		8.9%
Total indirect effects	-0.083	0.042	-0.169	-0.004	30.2%	
BIPQ-GAD-MCS	-0.053	0.021	-0.097	-0.017		19.3%
BIPQ-MC-MCS	-0.014	0.027	-0.068	0.038		-
BIPQ-GAD-MC-MCS	-0.016	0.010	-0.039	-0.002		5.8%
Total indirect effects	-0.140	0.050	-0.247	-0.050	50.9%	
BIPQ-GAD-MCS	-0.041	0.019	-0.083	-0.008		14.9%
BIPQ-PC-MCS	-0.071	0.033	-0.145	-0.015		25.8%
BIPQ-GAD-PC-MCS	-0.028	0.013	-0.058	-0.008		10.2%

BIPQ, Brief Illness Perception Questionnaire; GAD, generalized anxiety disorder; LLCI, lower limit confidence interval; MCS, mental component summary; PCS, physical component summary; QoL, quality of life; SE, standard error; ULCI, upper limit confidence interval

Anxiety symptoms mediate the impact of distorted disease perceptions on QoL, as evidenced by the clear relationship in where greater severity of cognitive biases leads to heightened anxiety levels, which, in turn, adversely affect QoL. This sequential mediation, commonly known as the chain mediation effect, implies that anxiety symptoms could further degrade QoL by exacerbating MC mechanisms and reducing problem-focused coping strategies. This elucidates the mechanism through which anxiety symptoms influence the QoL of patients with AE, underscoring the critical importance

of identifying and addressing anxiety symptoms in this patient population to enhance their QoL. Our findings are supported by previous research that successfully mitigated anxiety levels and concurrently improved QoL in patients with paroxysmal AF through a 10-week course of Cognitive Behavioral Therapy (CBT) while also addressing distorted disease cognition, particularly concerning perceived consequences, control over treatment, and overall disease understanding [31]. Another study also suggests that online CBT can significantly improve atrial fibrillation-specific quality of life and reduce medical

costs [32]. Contrary to the results reported by Le Grande et al. [33], we did not identify depression as a significant factor. It is important to note that the study sample exclusively comprised females, a demographic that has been observed to have a higher incidence of AF, poorer QoL, and increased symptomatology than males [34]. These sex-specific disparities may have contributed to the elevated levels of depression observed in this cohort, and the impact of such psychological comorbidities may have been more pronounced in this particular group.

Our study also suggests that MC strategies do not serve as mediators between the impact of distorted disease perceptions and QoL. Instead, they primarily act as mediators in the relationship between emotion-related perception and QoL. These nuanced findings emphasize the importance of considering specific pathways through which different factors influence QoL, highlighting the need for targeted interventions that address the emotional well-being of individuals. Conversely, problem-focused coping strategies directly mediate the effects of disease perception on QoL and the interaction between emotions-related perception and QoL. Lazarus and Folkman's foundational theory of stress and coping suggests that a deeper understanding of a disease's impact can empower individuals to adopt problem-focused coping strategies more readily, particularly in situations where individuals perceive greater control [35]. Several factors influence the selection and efficacy of various coping strategies. Despite the increasing recognition of psychological well-being, the focus and clinical evaluation of patient behavioral strategies remains insufficient. It is recommended to seamlessly integrate proactive coping strategies, including seeking constructive advice and engaging in planning as problem-focused strategies, into existing treatment protocols and actively communicate them to patients as part of their therapeutic process.

This study had several limitations that must be acknowledged. First, there was a recognized lack of objective physiological markers for patients with AF that could accurately reflect the severity of the condition. This absence may have affected the comprehensive assessment of the disease's impact and the subsequent evaluation of the intervention's effectiveness. Second, the study did not consider the duration of illness, which could have influenced patient perceptions and adaptation strategies over time [30]. Thirdly, this is a cross-sectional study, and we cannot ascertain the existence of a causal relationship between variables. The follow-up of patients or the establishment of a control group to account for confounding factors should be considered in future relevant research.

Conclusion

This study underscores the importance of considering patient multifaceted perceptions of their illness, including emotional and cognitive aspects, as part of disease management in future clinical practice. By addressing the complex interactions among illness perception, emotional well-being, and coping strategies, healthcare providers can promote a more holistic and patient-centered approach to disease management.

Abbreviations

AF	Atrial fibrillation
AFSS	Atrial fibrillation severity scale
BIPQ	Brief illness perception questionnaire
CSM	Common sense model
ECG	Electrocardiogram
GAD	7-Generalized anxiety disorder-7
HRQoL	Health-related quality of life
IQR	Interquartile range
PC	Problem-focused coping
PCS	Physical component summary
PHQ	9-Patient health questionnaire-9
SPSS	Statistical package for the social sciences
SD	Standard deviation
SF	12-12-Item short form health survey
MCS	Mental component summary
MC	Maladaptive coping
QoL	Quality of life
VIF	Variance inflation factor

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Author contributions

ZM was responsible for research design, formal analysis and was a major contributor in writing the original draft. XZ participated in data curation and writing review. SX implemented investigation and project administration. QS was responsible for funding acquisition and provided guidance on research design, data statistical analysis, and manuscript writing. All authors read and approved the final manuscript.

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Data availability

Please contact the corresponding author for reasonable data requests.

Declarations

Ethics approval and consent to participate

This research was sanctioned by Ethics Review Committee of Peking University People's Hospital in accordance with ethical protocol (2020PHB151).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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