Patient Preference and Adherence

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ORIGINAL RESEARCH

The Mediating Effects of Self-Acceptance and Self-Evaluation on Mindfulness and Benefit -Finding in a Sample of Chinese Systemic Lupus Erythematous Patients

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Purpose: This study investigated the relationship between mindfulness, self-acceptance and benefit-finding in SLE patients. Through structural equation models, we examined the mediating role of self-acceptance and self-evaluation between mindfulness and benefit-finding.

Patients and Methods: We used a convenient sampling method to investigate the demographics characteristics, mindfulness, self-acceptance, and benefit-finding of 319 SLE patients who were admitted to the rheumatology and immunology departments of tertiary, and Grade-A hospitals from December 2019 to December 2020.

Results: Educational Levels, age, presence of other diseases besides SLE, medical expense payment method can affect mindfulness, and benefit-finding in SLE patients ($p<0.05$), monthly salary can also influence mindfulness ($p<0.05$), marital status also have impact on benefit-finding ($p<0.05$). Educational Levels, age and monthly salary can affect the self-acceptance of SLE patients ($p<0.05$). Mindfulness is positively correlated with the benefit-finding and has a significant positive impact on it ($r=0.379$, $p<0.01$). Mindfulness is positively correlated with self-acceptance, and self-evaluation ($r = 0.124$ and 0.130, $p < 0.05$), which are positively correlated with the benefit-finding ($r = 0.256$ and 0.255, $p < 0.05$) in turn. Self-acceptance, and self-evaluation played a partially mediating role in the relationship between mindfulness, and the benefit-finding in SLE patients, with the mediating effect accounting for 7.95% (The path coefficient was 0.0391, $p < 0.01$), and 7.74% of the total effect (The path coefficient was 0.0384, $p < 0.01$), respectively.

Conclusion: Mindfulness, self-acceptance, and benefit-finding in SLE patients are influenced by various sociodemographic factors. Self-acceptance and self-evaluation can mediate the relationship between mindfulness and benefit-finding in SLE patients. Clinical caregivers should pay more attention to improving patients' levels of mindfulness and their self-acceptance of the disease, and guide patients in cognitive reappraisal, so that they can benefit from the struggle with the disease.

Keywords: systemic lupus erythematosus, SLE, mindfulness, self-acceptance, benefit-finding, mediation role

Introduction

Systemic lupus erythematosus (SLE) is a chronic autoimmune inflammatory connective tissue disease, which can affect joints, kidneys, skin, mucous membranes, and blood vessel walls. Common symptoms include fatigue, fever, arthralgia, myalgia, weight loss, rash, oral ulcers, thrombocytopenia, and leukopenia.[1,2] The severity of SLE varies between mild and severe. Women experience significantly worse outcomes in lupus symptoms, cognition, and fertility, and experience worse functioning in the domains of physical function and pain-vitality.[3] Currently, the treatment of SLE mainly includes general treatment, and drug therapy, with the latter being widely used. Long-term drug use brings economic, mental, and physiological burdens due to side effects, and both disease progression and drug therapy impact patients' emotions

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negatively. Approximately 54.5% of SLE patients suffer from depression, while 61.5% suffer from anxiety, with the severity of these conditions positively correlated with disease activity, which greatly affect their quality of life.[4] Interactions between depression, anxiety, and SLE can lead to an increased incidence of suicidal ideation, poor treatment adherence, and increased dysfunction.[5,6] SLE is regarded as a stress-related disease, with stress conditions often worsening symptoms.[7] Some studies suggest that depressive symptoms, and health-related quality of life (HRQoL) in patients with rheumatic diseases can be improved by antidepressants and psychotherapy. Therefore, targeted interventions should be carried out for depressive symptoms in patients with SLE.[8]

Over the past 20 years, positive psychology has advocated for a positive attitude towards disease, and researchers have begun to consider the positive benefits of trauma, such as improvements in quality of life, post-traumatic growth, social support, and well-being.[9] This is especially relevant for long-term, chronic, and recurrent diseases like SLE. The involvement of multiple organs in SLE patients has a profound impact on their health-related quality of life and mental health.[10,11] In particular, disease activity, severity of fatigue, psychological morbidity, and body image in SLE are correlated with quality of life (QoL).[12] Positive psychology encompasses mindfulness, self-acceptance, resilience, benefit-finding, and post-traumatic growth, etc. The Monitoring and Acceptance Theory predicts that removing acceptance skills training from mindfulness interventions (acceptance is an emotion regulation skill) will weaken its protective effect against stress-related diseases.[13] Mindfulness training has also been proven to be beneficial to patients with multiple sclerosis by encouraging self-acceptance of the presence of emotions such as worry.[14] It can also benefit patients with inflammatory bowel disease by fostering disease acceptance and self-compassion.[15] However, no such studies have been conducted on SLE patients.

Theoretical Analysis and Model Hypothesis

According to the "Mindful Coping Model", individuals first undergo primary and secondary evaluations when faced with stressor stimuli. They then use mindfulness to redirect attention, achieving positive reappraisal, which increases positive emotions and reduces stress.[16] As a positive coping style, and emotion regulation strategy, self-acceptance includes self-evaluation, and the resulting self-experience and attitude,[17] which encompass both psychological and physical attributes. For example, individuals who have a positive self-evaluation of their bodies possess an accurate self-awareness.[18,19] Individuals with higher levels of self-acceptance are more likely to adopt positive coping styles.[20] Therefore, it can be speculated that self-acceptance, and self-evaluation (two dimensions of the SAQ) may help patients reduce stress and negative emotions, and facilitate benefit-finding in SLE patients according to the Mindful Coping Model, but the specific mechanism is not very clear.

Relationship Between Mindfulness, and Benefit-Finding

Mindfulness is a psychological state that involves focusing one's attention on the present moment and accepting the thoughts and feelings that arise, rather than immediately reacting to or judging them.[21] Benefit-finding refers to the positive changes in self-perception that result from highly stressful experiences, usually achieved through cognitive reappraisal. This change can reduce the inherent threats associated with negative events, allowing individuals to recover or alter their views of themselves, others, and the world.[22] Mindfulness, and benefit-finding are interconnected. Evidence shows that mindfulness training can alleviate the burden of stress-related illnesses.[23] Mindfulness-based interventions (MBIs) can enhance accurate symptom assessment, reduce symptoms of chronic diseases, and improve disease management, and health outcomes.[24] One study found that through the practice of yoga, practitioners can influence their personal resources such as mindfulness or self-compassion, thereby gaining benefits.[25]

Relationship Between Mindfulness, and Self-Acceptance

Self-acceptance reflects the degree to which individuals accept themselves, embracing all their characteristics, both good and bad, with a positive attitude.[26] It encompasses two dimensions: self-acceptance (SAQ-SA), and self-evaluation (SAQ-SE), forming the foundation of self-esteem. Both self-evaluation and self-acceptance are dominated and restricted by the ideal self. However, self-evaluation cannot be completely equated with self-acceptance. For example, a person with low self-evaluation can still be self-accepting, while a person with high self-evaluation can also be self-unaccepting. When self-acceptance is

lacking, a sense of inferiority will emerge psychologically, leading to feelings of low self-esteem.[27] Studies have shown that mindfulness is highly correlated with self-acceptance. Mindfulness practice is associated with increased awareness, and self-acceptance.[28,29] It involves being aware of emotional experiences with an attitude of acceptance, and non-judgment.[30] Several studies have identified cognitive reappraisal as a mediator between mindfulness and depression, with a positive correlation of 0.294 between mindfulness and reappraisal.[31] Mindfulness promotes positive reappraisal through cognitive transformation, facilitating a shift of attention from negative to positive emotional stimuli, which is central to positive reappraisal.[7]

Relationship Between Self-Acceptance, and Benefit-Finding

Studies have found a positive correlation between self-acceptance, and positive coping styles.[32] Research on breast cancer patients has shown that positive coping through cognitive-behavioral stress intervention can reduce depressive symptoms and enhance perceived benefits.[33] This suggests that a patient's self-acceptance is correlated with benefit-finding. Benefit-finding is described as a positive reappraisal process,[34] where individuals experience greater benefits when they mobilize their potential coping, and problem-solving abilities, enhance self-confidence, and improve self-efficacy to produce positive change.[35]

The Mediating Role of SAQ-SA, and SAQ-SE

Self-acceptance plays a mediating role between mindfulness, and subjective well-being in college students.[36,37] A study of empty-nest elderly in rural areas found that self-acceptance partially mediates the relationship between self-worth, and subjective well-being.[38] Additionally, self-acceptance has been shown to partially mediate the relationship between mindfulness, and peace of mind.[39] Cognitive reappraisal can influence self-evaluation, and Shi's study suggests that this strategy can mediate the relationship between personality traits, and mental experience.[40]

Numerous studies have found correlations between these factors.[28,41] The positive psychological effects of mindfulness have been confirmed by a wide range of studies. Mindfulness meditation,[42] mindfulness-based stress reduction,[17] and mindfulness-based cognitive therapy have been widely used in treating SLE.[43] However, research on self-acceptance, and benefit-finding in SLE patients is limited. Only one study found that complex complications, CD4+/CD8+ levels, coping style, depression, social support, and poor sleep quality were associated with post-traumatic growth in adult SLE patients.[44] After reviewing the theoretical, and empirical literature, the research question of this study is: What are the influencing factors of mindfulness, self-acceptance, and benefit-finding in SLE patients, and do SAQ-SA, and SAQ-SE mediate the relationship between mindfulness and benefit-finding? We propose the following research hypotheses:

H1: Mindfulness is associated with benefit-finding in SLE patients.

H2: Mindfulness is associated with SAQ-SA in SLE patients.

H3: Mindfulness is associated with SAQ-SE in SLE patients.

H4: SAQ-SA is associated with benefit-finding in SLE patients.

H5: SAQ-SE is associated with benefit-finding in SLE patients.

H6: SAQ-SA mediates the relationship between mindfulness, and benefit-finding.

H7: SAQ-SE mediates the relationship between mindfulness, and benefit-finding.

Figure 1 shows the hypothetical model.

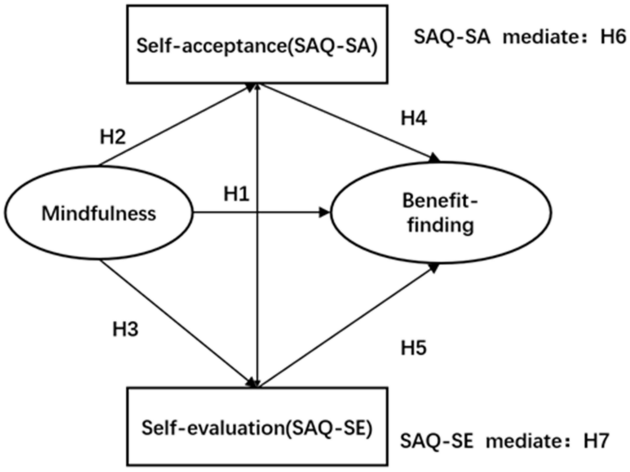

Figure 1 Hypothetical model.

Participants and Methods

Research Participants

This study employs a cross-sectional research design, with the research team conducting a questionnaire survey in a tertiary hospital in Hangzhou. Data collection was carried out from December 2019 to December 2020. According to Structural Equation Modeling (SEM) guidelines, the minimum sample size should be 10 times the estimated number of paths in the model.[45] Thus, the minimum sample size for this study was determined to be 160 cases. Considering a 10% rate of attrition, the appropriate sample size for this study was set at 180. A total of 352 SLE patients from five tertiary A-grade hospitals were selected using convenience sampling principles between December 2019 and December 2020. Inclusion criteria were as follows: patients had to meet the classification, and diagnostic criteria for SLE revised by the American College of Rheumatology (ACR) in 1997, have a disease duration between 0.5 and 5 years, possess normal cognitive function, and adequate language comprehension, be aged 18 years or older, and be able to provide informed consent. Exclusion criteria included patients with serious complications such as heart, brain, and kidney issues, inability to read or write in Chinese, and inability to complete assessments due to vision impairment, among others (Table 1).

This study was approved by the Ethics Review Committee of the Institutional Review Board of the Institutional Review Board (IRB) of Zhejiang Shu Ren University (NO:20200105). Participation was voluntary, anonymity was guaranteed. Informed consent was provided by all participants prior to participating in the survey.

Data Collection

Initially, the research team underwent training for data collection between December 2019, and December 2020. The primary researcher conducted surveys at one hospital, while the research team, assisted by fellow nurses, distributed questionnaires at other hospitals. A total of 352 questionnaires were personally distributed at hospital outpatient clinics or wards. Unified guidelines were employed to explain the research objectives and important principles to the participants, emphasizing the anonymity, and confidentiality of data collection and usage. It took approximately 15 to 20 minutes to complete the questionnaire. All questionnaires were filled out independently by the patients, and collected after completeness checks by the research team members. Since each questionnaire was checked for completeness of completion by the research team members, there were no missing values in the questionnaire responses. After excluding 33 invalid questionnaires that exhibited the same response or adherence to specific patterns, 319 valid questionnaires were obtained, resulting in an effective rate of 90.63%. To ensure data accuracy, two individuals independently entered the data while a third checked for discrepancies. Additionally, an associate professor with extensive statistical experience was invited to oversee data processing, ensuring the accuracy, and rigor of statistical analysis.

Table 1 Subgroup Analysis of Sociodemographic Factors on Mindfulness, SAQ, and Benefit-Finding (n=319)

Variables		Number (Proportion%)	Mindfulness score M (P25, P75)	H (K) / Zvalue	*P* value	SAQ score M (P25, P75)	H (K) / Zvalue	*P* value	Benefit-finding score M (P25, P75)	H (K) / Zvalue	*P* value
Gender	Female	279 (87.46)	124.00 (94.00,139.00)	−0.61	0.542	40.00 (32.00,45.00)	−1.419	0.156	70.00 (60.00,75.00)	−0.74	0.459
	Male	40 (12.54)	125.00 (85.25,137.00)			39.00 (31.00,41.00)			71.00 (59.25,75.00)		
Educational Levels	Junior high school and below	68 (21.32)	101.00 (78.25,137.00)	10.697	0.005	35.50 (23.00,40.00)	7.709	0.021	66.00 (40.25,72.00)	13.529	0.001
	Senior high school/junior college	173 (54.23)	125.00 (98.00,137.00)			39.00 (33.00,41.00)			70.00 (62.50,75.00)		
	Bachelor degree or above	78 (24.45)	132.50 (101.00,140.00)			40.00 (35.00,42.00)			70.00 (60.00,75.00)		
Age (years)	18-29	93 (29.15)	132.00 (98.00,140.00)	10.847	0.013	40.00 (31.00,42.50)	9.712	0.021	73.00 (67.50,76.00)	28.534	<0.001
	30-39	91 (28.53)	125.00 (97.00,137.00)			39.00 (32.00,42.00)			69.00 (58.00,74.00)		
	40-49	68 (21.32)	114.00 (89.75,134.75)			35.50 (29.00,40.00)			70.00 (62.25,73.75)		
	50 and above	67 (21.00)	104.00 (89.00,135.00)			38.00 (23.00,42.00)			63.00 (42.00,73.00)		
Monthly salary (Yuan)	Below 3000	57 (17.87)	111.00 (87.50,139.50)	12.169	0.007	33.00 (24.00,40.00)	11.454	0.01	70.00 (44.00,74.00)	7.628	0.054
	3000-7000	127 (39.81)	104.00 (92.00,137.00)			39.00 (27.00,42.00)			69.00 (57.00,74.10)		
	7000-11,000	107 (33.54)	128.00 (101.00,139.99)			39.00 (31.00,42.00)			71.00 (63.00,75.00)		
	More than 11,000	28 (8.78)	134.50 (104.75,140.75)			40.00 (35.00,43.00)			70.00 (61.75,75.00)		
Religious belief	No	26 (8.15)	119.50 (88.25,136.00)	−0.564	0.573	40.00 (27.00,43.00)	−0.718	0.473	71.50 (62.25,74.25)	−0.539	0.59
	Yes	293 (91.85)	125.00 (94.00,138.00)			38.00 (31.00,41.00)			70.00 (59.00,74.00)		
Marital status	Married	203 (63.64)	119.00 (94.00,137.00)	4.259	0.119	37.00 (35.00,43.00)	1.454	0.483	69.00 (57.00,74.00)	8.768	0.012
	Unmarried	106 (33.23)	130.00 (97.75,140.00)			39.50 (30.00,42.00)			71.00 (66.75,75.00)		
	Others	10 (3.13)	101.00 (80.75,123.75)			38.50 (28.00,40.50)			65.00 (56.75,69.25)		
Occupational status	Freelance	77 (24.14)	125.00 (101.00,137.00)	4.278	0.118	38.00 (29.00,40.00)	3.332	0.189	70.00 (63.00,74.00)	5.269	0.072
	Currently Employed	160 (50.16)	128.00 (94.00,139.00)			39.00 (33.00,44.00)			70.00 (60.00,75.00)		
	Others	82 (25.70)	104.50 (90.25,137.25)			39.50 (31.75,42.00)			67.50 (47.00,74.00)		
Presence of other diseases besides SLE	No	201 (63.01)	128.00 (97.00,139.00)	−2.61	0.009	39.00 (31.00,41.00)	−0.212	0.832	70.00 (62.50,75.00)	−2.849	0.004
	Yes	118 (36.99)	103.50 (92.75,135.00)			38.75 (33.00,42.00)			68.50 (53.50,74.00)		
Course of the disease (year)	0.5-5	117 (36.68)	123.00 (93.50,139.50)	0.249	0.993	39.00 (31.50,41.00)	6.153	0.188	68.00 (51.50,74.00)	6.149	0.188
	6-10	98 (30.72)	125.00 (94.00,137.00)			40.00 (32.00,44.00)			70.00 (62.75,75.00)		
	11-15	53 (16.62)	126.00 (89.00,138.50)			39.00 (30.00,43.50)			70.00 (63.00,75.00)		
	16-20	27 (8.46)	125.00 (98.00,135.00)			38.00 (33.00,40.00)			73.00 (63.00,75.00)		
	More than 20	24 (7.52)	119.00 (101.50,137.00)			38.50 (32.25,43.00)			71.00 (64.00,75.00)		
Medical expense payment method	Self-pay	36 (11.29)	101.00 (82.00,134.75)	6.438	0.04	33.00 (23.00,39.00)	4.916	0.086	61.00 (42.00,73.00)	9.846	0.007
	Enterprise and Institution Medical Insurance	218 (68.34)	127.00 (94.00,139.00)			39.00 (32.50,42.00)			70.00 (63.00,75.00)		
	New Rural Cooperative Medical Scheme	65 (20.38)	116.00 (95.50,136.00)			38.72 (30.00,41.50)			70.00 (54.50,74.00)		

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Measurements

General Information Questionnaire

We developed a demographic questionnaire to assess the characteristics of the participants. Considering the impact of general demographic factors such as gender and age on the disease, as well as the influence of monthly salary, occupational status, medical expense payment method, and educational levels on the economic situation of chronic diseases and the awareness of disease knowledge, presence of other diseases besides SLE, course of the disease on the damage of chronic diseases, and the marital status and religious beliefs in the social and spiritual support for patients, covering gender, educational levels, age, monthly salary, religious beliefs, marital status, occupational status, presence of other diseases besides SLE, course of the disease, and medical expense payment method.

Five-Facet Mindfulness Questionnaire (FFMQ)

This scale, originally developed by Baer et al[46] underwent Chinese revision by Deng et al[47] in 2011 and was utilized in this study. It encompasses 5 dimensions: describing, observing, non-reactivity, non-judgment, and acting with awareness. The Likert 5-level scoring method was employed, ranging from "not consistent at all" to "fully consistent with", measured on a 1–5 scale. The scale comprises 39 questions, including 20 positively scored items, and 19 reverse-scored items. Total scores were found to be positively correlated with levels of mindfulness. In the original validation study, the scale demonstrated high internal consistency with a Cronbach's α of 0.917. In this study, the Cronbach's α coefficient was 0.914 Supplementary materials.

The Self-Acceptance Questionnaire (SAQ)

The Self-Acceptance Questionnaire, developed by Cong Zhong, and Gao Wenfeng,[27] encompasses two dimensions: self-evaluation (SAQ-SE), and self-acceptance (SAQ-SA) Supplementary materials. The scale comprises 16 items, with each dimension containing 8 items. A Likert 4-level scoring method was utilized, where responses ranging from "very identical" to "very opposite" were scored as 4, 3, 2, and 1 point, respectively. The cumulative score of the 8 items for SAQ-SE, and SAQ-SA respectively represented the scores for each factor, while the total scale score was the sum of these two factors, ranging from 16 to 64. A higher total score indicates a higher level of self-acceptance among subjects. The scale demonstrated good reliability and validity. The internal consistency coefficients for SAQ-SA, and SAQ-SE were 0.9344, and 0.9124, respectively. The scale also exhibited satisfactory retest reliability with a coefficient of 0.7653. In this study, the Cronbach's alpha coefficient was 0.702.

The Benefit-Finding Scale for Adults (BFS-A)

This scale, adapted by Weaver et al,[48] comprises 6 dimensions, and 22 items, covering acceptance, personal growth, social relations, family relations, health behaviors, and worldview. Each item is rated on a 5-point scale, ranging from 1 (not at all) to 5 (very much). The total score, ranging from 22 to 110, is calculated as the sum of all items, with higher scores indicating greater Benefit-finding (BF) status. Its Chinese version, translated by Liu,[49] demonstrated high reliability with a Cronbach's coefficient alpha of 0.95. In this study, the Cronbach's alpha coefficient was 0.856 Supplementary materials.

Data Analysis

We conducted statistical analysis using SPSS 25.0 software. Initially, data were assessed for normal distribution or not. Normally distributed measurement data were described using the mean ($\bar{x}$), and standard deviation (s), while frequency or component ratios were used for count data. For non-normally distributed data, statistical description was provided using the median, and interquartile range. The Mann–Whitney *U*-test, and Kruskal–Wallis *H*-test were employed to analyze the related factors of socio-demographic characteristics with mindfulness, self-acceptance, and benefit-finding. Spearman correlation analysis was then utilized to examine the correlations between mindfulness, SAQ, and benefit-finding. When the residuals of the test variables did not adhere to a normal distribution, Box-Cox transformation was applied to the data. Additionally, Harman's single factor test was conducted to mitigate common methodological biases. Prior to testing for mediation effects, the measurement model underwent confirmatory factor analysis. Using AMOS 24.0, we constructed a Structural Equation Model to explore the mediating effect of SAQ-SA, and SAQ-SE between

mindfulness, and benefit-finding. The bias-corrected bootstrap method was employed to assess the significance of mediating effects, while obtaining robust standard errors, and confidence intervals for parameter estimation. Statistically significant results were determined if the confidence interval did not include zero.[50]

Results

Subgroup Analysis of Socio-Demographic Factors on Mindfulness, SAQ, and Benefit-Finding

The majority of subjects were female (279, 87.46%), with a predominant educational level of high school/technical secondary school (173, 54.23%). The distribution of patients across different age groups was similar, with slightly more than 127 individuals (39.81%) earning a monthly salary of 3000–7000 yuan. The majority of patients reported having a religious belief (293, 91.85%), while a relatively high proportion were married (203, 63.64%). Most subjects were currently employed (160, 50.16%), and a minority reported having other diseases besides SLE (63.01%). Approximately 117 patients (36.68%) had a disease duration ranging from 0.5 to 5 years, and 218 patients (68.34%) utilized enterprise and institution medical insurance as their payment method. Significant differences in mindfulness among SLE patients were observed based on educational levels, age, monthly salary, presence of other diseases besides SLE, and medical expense payment method ($P < 0.05$). Similarly, educational levels, age, and monthly salary exhibited significant differences in the Self-Acceptance Questionnaire (SAQ) among SLE patients ($P < 0.05$). Notably, significant differences in benefit-finding were observed among SLE patients based on educational levels, age, marital status, presence of other diseases besides SLE, and medical expense payment method ($P < 0.05$). Subgroup analysis of sociodemographic factors on mindfulness, SAQ, and benefit-finding is presented in Table 1.

Correlation Between Mindfulness, SAQ, and Benefit-Finding

Mindfulness, and the self-acceptance (SAQ) demonstrated a significant positive correlation ($r = 0.120$, $P < 0.05$). Specifically, all dimensions of mindfulness were positively related to SAQ-SA ($r = 0.067–0.149$). Notably, the differences in describing, and non-reactivity were statistically significant ($P < 0.05$). Additionally, these dimensions showed positive correlations with SAQ-SE ($r = 0.097–0.142$), with observing, describing, and non-reactivity exhibiting significant differences ($P < 0.05$). Benefit-finding was significantly, and positively associated with SAQ ($r = 0.301$, $P < 0.01$). SAQ-SA was positively correlated with all dimensions of benefit-finding ($r = 0.075–0.304$). Similarly, SAQ-SE demonstrated positive correlations with all dimensions of benefit-finding ($r = 0.136–0.262$, $P < 0.05$). Furthermore, mindfulness exhibited a significant positive association with benefit-finding ($r = 0.383$, $P < 0.01$). Each dimension of mindfulness was positively correlated with each dimension of benefit-finding ($r = 0.126–0.403$, $P < 0.05$). For detailed information, please refer to Table 2.

Testing for Mediation Effect of SAQ-SA and SAQ-SE

Common Method Deviation Test

To mitigate potential common methodological biases inherent in self-reported data,[51] we conducted the Harman single factor test prior to data analysis. Exploratory factor analysis was performed on the questions pertaining to mindfulness, self-acceptance, and benefit-finding. Results revealed that after rotation, the eigenvalues of 12 factors exceeded 1, with the explanatory rate of the first common factor being 23.647%. This value significantly falls below the critical threshold of 40%. Consequently, there is no notable indication of significant common methodological bias in this study.[52]

Measurement Model Check

Before conducting the mediation effect test, the measurement model underwent confirmatory factor analysis. This study incorporated three potential variables: mindfulness (comprising observing, describing, acting with awareness, non-judgment, and non-reactivity), self-acceptance (SAQ) including SAQ-SA, and SAQ-SE, and benefit-finding (encompassing acceptance, family relations, worldview, personal growth, social relations, and health behaviors). The results of the confirmatory factor analysis indicated a good fit for the model, with $\chi^2(62) = 141.912$, CFI (Comparative Fit Index) = 0.966, TLI (Tucker-Lewis Index) = 0.957, SRMR (Standardized Root Mean Square Residual) = 0.037, RMSEA (Root Mean Square Error of Approximation) = 0.064. Moreover, the 90% confidence intervals for RMSEA fell within the range

Table 2 Correlation Analysis of Mindfulness, SAQ, and Benefit-Finding in SLE Patients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1.000															
2	0.832**	1.000														
3	0.805**	0.648**	1.000													
4	0.806**	0.612**	0.603**	1.000												
5	0.860**	0.684**	0.613**	0.645**	1.000											
6	0.877**	0.676**	0.691**	0.679**	0.735**	1.000										
7	0.120*	0.111*	0.138*	0.091	0.076	0.119*	1.000									
8	0.124*	0.073	0.149**	0.095	0.067	0.137*	0.790**	1.000								
9	0.130*	0.136*	0.127*	0.108	0.097	0.142*	0.838**	0.396**	1.000							
10	0.383**	0.322**	0.230**	0.329**	0.405**	0.320**	0.301**	0.260**	0.263**	1.000						
11	0.342**	0.318**	0.166**	0.314**	0.333**	0.319**	0.105	0.075	0.136*	0.766**	1.000					
12	0.253**	0.139*	0.275**	0.190**	0.209**	0.211**	0.297**	0.262**	0.262**	0.643**	0.473**	1.000				
13	0.222**	0.126*	0.126*	0.255**	0.200**	0.162**	0.294**	0.304**	0.208**	0.683**	0.499**	0.457**	1.000			
14	0.327**	0.286**	0.192**	0.258**	0.403**	0.283**	0.224**	0.189**	0.213**	0.810**	0.544**	0.448**	0.404**	1.000		
15	0.226**	0.254**	0.151**	0.170**	0.219**	0.179**	0.279**	0.227**	0.254**	0.665**	0.516**	0.472**	0.408**	0.419**	1.000	
16	0.362**	0.376**	0.230**	0.316**	0.337**	0.337**	0.285**	0.269**	0.259**	0.721**	0.606**	0.485**	0.456**	0.489**	0.480**	1.000

Notes: 1 to 16 are mindfulness, observing, describing, acting with awareness, non-judgment, non-reactivity, self-acceptance (SAQ), self-acceptance (SAQ-SA), self-evaluation (SAQ-SE), the benefit-finding, acceptance, family relations, worldview, personal growth, social relations, health behaviors, respectively. Significance levels: $P < 0.05$ (*), $P < 0.01$ (**).

Table 3 Factor Loading Coefficient Table

Variable	Std	SE	Z(CR)	P	CR	AVE
Mindfulness						
Observing	0.525	0.07	7.462	***	0.967	0.594
Describing	0.591	0.075	7.915	***		
Acting with awareness	0.517	0.071	7.335	***		
Non-judgment	0.684	0.083	8.233	***		
Non-reactivity	0.644	0.079	8.172	***		
Self-Acceptance Questionnaire (SAQ)						
SAQ-SA	0.382	0.043	8.974	***	0.947	0.53
SAQ-SE	0.407	0.047	8.746	***		
Benefit-finding						
Acceptance	0.595	0.076	7.832	***	0.96	0.546
Family relations	0.44	0.073	5.998	***		
Worldview	0.556	0.078	7.083	***		
Personal growth	0.469	0.064	7.342	***		
Social relations	0.397	0.064	6.158	***		
Health behaviors	0.483	0.071	6.8	***		

Note: All standardized factor loadings were statistically significant for their corresponding latent variables (***P < 0.001).

[0.532, 0.750], suggesting satisfactory model fit. Additionally, Table 3 revealed that the standardized load of each index was significant for the corresponding factors (P < 0.001). Furthermore, the Average Variance Extracted (AVE) value exceeded 0.50, and the Composite Reliability (CR) value exceeded 0.70, indicating good data aggregation validity.

Mediating Effect Test

After controlling for gender, educational levels, age, monthly salary, religious belief, marital status, occupational status, presence of other diseases besides SLE, course of the disease, and medical expense payment method in the Structural Equation Model (SEM), the parameters were estimated using the variance maximum likelihood method, and bootstrap testing was employed to examine the mediating effect. A SEM model was constructed with mindfulness (comprising five latent variables: observing, describing, acting with awareness, non-judgment, and non-reactivity) as the independent variable, benefit-finding (comprising six latent variables: acceptance, family relations, worldview, personal growth, social relations, and health behaviors) as the dependent variable, and self-acceptance (comprising two latent variables: SQA-SA, and SQA-SE) as the mediating variable. The final model is illustrated in Figure 2, with all fitting indexes meeting statistical requirements, indicating good model fit (Table 4). Parameter values obtained from the final model fitting and the average values of parameters obtained during the bootstrap process are presented in Table 5 and Table 6. Hypotheses H1-H7 were confirmed as follows: (1) Mindfulness directly, and positively predicts benefit-finding, with a standardized estimate of the

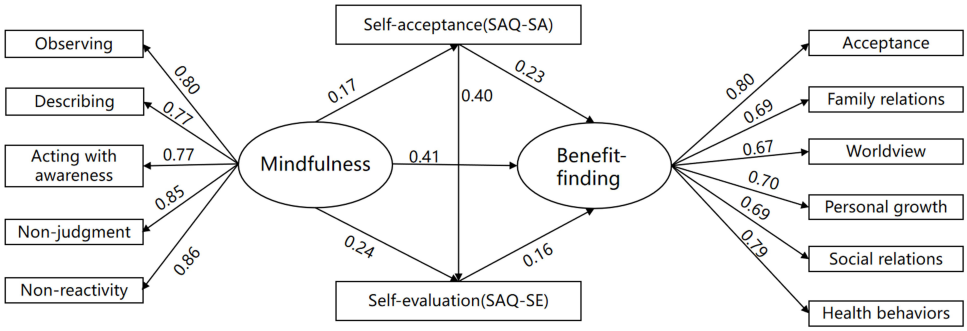

Figure 2 Model of the mediating effect of SAQ-SA, SAQ-SE on mindfulness, and the benefit-finding of SLE patients.

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Table 4 Structural Equation Model Fitting Index (n = 319)

Project	χ2	CMIN/df	GFI	NFI	CFI	IFI	TLI	RMSEA
Modified fitting index	153.202	2.512	0.933	0.927	0.955	0.955	0.942	0.069
Acceptable standards	/	< 5	> 0.9	> 0.9	> 0.9	> 0.9	> 0.9	< 0.08

Note: CMIN/df Maximum likelihood ratio χ2 values / degrees of freedom.
Abbreviations: RFI, Relative fitness index; NFI, Standard fit index; CFI, Comparative fit index; IFI, Value added index; TLI, Nonstandard fit index; RMSEA, Mean square sum square root of progressive residuals.

Table 5 Coefficient Decomposition of Mindfulness, SAQ-SA, SAQ-SE, and Benefit-Finding Effect Model in SLE Patients (n=319)

		Estimated Value	SE	95% Confidence Interval		p-value
				Lower Bound	Upper Bound	
Direct effect						
Mindfulness	Self-evaluation	0.238	0.06	0.113	0.349	0
	Self-acceptance	0.17	0.065	0.035	0.29	0.015
	Benefit-finding	0.414	0.053	0.302	0.511	0
SAQ-SE	Benefit-finding	0.162	0.061	0.045	0.284	0.009
SAQ-SA	Benefit-finding	0.233	0.059	0.119	0.348	0.001
Indirect effect						
Mindfulness	Benefit-finding	0.078	0.027	0.03	0.137	0.001
Total effect						
Mindfulness	Benefit-finding	0.492	0.057	0.369	0.593	0.001

Table 6 Path Coefficient Estimates, Standard Errors, 95% Confidence Intervals, and Effect Proportions for Each Path

Effect	Path	Estimated Value	Standard Error	Effect Size	Total Effect	Bootstrap (95% CI)
Direct effect	M-BF	0.414	0.053	84.15%	0.492	[0.302~0.511]
Indirect effect	M-SAQ-SA- BF	0.0391	0.027	7.95%		[0.045~0.284]
	M--SAQ-SE- BF	0.0384	0.027	7.74%		[0.119~0.348]

Notes: M, BF, SAQ-SA, SAQ-SE were mindfulness, benefit-finding, self-acceptance, self-evaluation, respectively.

path coefficient at 0.414 (t = 7.043, P < 0.01). (2) SAQ-SA is a direct positive predictor of benefit-finding, with a standardized estimate of the path coefficient at 0.233 (t = 4.119, P < 0.01), and SQA-SE also directly predicts benefit-finding positively, with a standardized estimate of the path coefficient at 0.162 (t = 2.833, P < 0.01). (3) Mindfulness is a direct positive predictor of SAQ-SA, with a standardized path coefficient of 0.170 (t = 2.918, P < 0.01), and mindfulness also directly predicts SAQ-SE positively, with a standardized path coefficient of 0.238 (t = 4.118, P < 0.01). (4) Mindfulness influences benefit-finding through SAQ-SA, and SAQ-SE, with standardized estimation of the indirect influence path coefficient at 0.0391, and 0.0384, respectively. The mediation effect accounts for 7.95%, and 7.74% of the total effect, respectively. The partial mediating effect of SAQ-SA is slightly stronger than that of SAQ-SE, as detailed in Table 6.

Discussion

This study aims to investigate the factors influencing mindfulness, self-acceptance, and benefit-finding in SLE patients at tertiary hospitals in East China. Additionally, it seeks to construct a mediating model involving SAQ-SA, and SAQ-SE between mindfulness, and benefit-finding in SLE patients.

Subgroup Analysis of Socio-Demographic Factors on Mindfulness, SAQ, and Benefit-Finding

Significant differences were observed in the mindfulness among SLE patients with varying educational levels, ages, monthly salaries, presence of other diseases besides SLE, and medical expense payment method in this study. Patients with higher educational levels exhibited greater cognition of SLE, a more comprehensive understanding of the disease, and a higher level of mindfulness, echoing findings from Camilleri's study.[53] Contrary to previous research indicating a positive correlation between age, and mindfulness,[54] our study found higher mindfulness levels among younger patients. This finding may be attributed to the physical decline experienced by elderly patients, and the chronic suffering associated with SLE, which may make older individuals more susceptible to sub-syndromes of depression compared to other age groups.[55] Regarding the presence of other diseases besides SLE, patients with multiple co-morbidities exhibited lower mindfulness compared to those without additional ailments. The co-occurrence of hypertension, diabetes, coronary heart disease, and other underlying conditions can lead to significant physiological strain, and exacerbate negative emotions.[56] The complexity of managing multiple diseases, including adhering to various medication regimens, may also contribute to decreased mindfulness among SLE patients. Furthermore, our study revealed that SLE patients with higher monthly salaries, and enterprise and institution medical insurance demonstrated relatively higher mindfulness, consistent with findings by Bränström.[57] Patients with better financial means often have access to superior medical insurance coverage, reducing financial stress during treatment. This financial stability enables them to afford non-insurance medications, explore alternative treatment modalities, and dedicate adequate time, and energy towards coping with, overcoming, and self-managing their condition, thus exhibiting higher mindfulness.

Educational levels, age, and monthly salaries were identified as influential factors on the SAQ among SLE patients in this study. SLE patients with higher educational levels exhibited elevated SAQ, consistent with findings by Xia.[58] Research indicates that individuals with lower educational attainment may struggle to comprehend treatment plans, fail to seek timely assistance, and exhibit reduced treatment adherence.[59] Consequently, their disease prognosis worsens, contributing to negative emotions, and diminished self-acceptance. Elderly patients tended to report lower SAQ, echoing findings from Xia's study.[58] Specifically, SLE patients aged 40–49 years demonstrated the lowest SAQ in our study. Patients in this age bracket often shoulder substantial responsibilities in both their careers, and families, frequent hospital visits disrupt their professional, and familial roles. Additionally, the physiological changes associated with aging, coupled with prolonged, and high-dose steroid therapy, can lead to physical manifestations like moon face, alopecia, and buffalo hump, causing significant psychological distress.[60] These factors collectively contribute to diminished self-evaluation, and self-acceptance. Furthermore, higher monthly incomes were associated with elevated SAQ, aligning with Zhu's findings that students from affluent backgrounds,[61] and supportive family environments exhibit better self-acceptance, and mental well-being. Conversely, patients with lower incomes bear a heavier financial burden due to disease treatment, leading to feelings of inferiority, and an inability to achieve normal levels of self-acceptance.

Significant discrepancies in benefit-finding were observed among SLE patients with varying educational levels, ages, marital statuses, presence of other diseases besides SLE, and medical expense payment method in this study. Undergraduate patients exhibited higher benefit-finding compared to other groups, aligning with Liu's findings.[62] Patients with higher educational levels typically possess greater treatment-seeking abilities, a deeper understanding of disease-related information, and stronger self-management skills, leading to heightened benefit-finding experiences. Younger patients also reported higher benefit-finding, consistent with Heusler's study.[63] This could be attributed to the greater receptivity of younger patients, and their ability to perceive the positive aspects of their situation, thereby experiencing more benefits. Conversely, elder patients, burdened by physiological decline, disease severity, and economic constraints, may experience feelings of guilt, and diminished confidence in recovery during treatment,[64] resulting in relatively fewer perceived benefits. Surprisingly, unmarried patients exhibited higher benefit-finding compared to their married counterparts, contrary to the expectation that married patients would benefit more due to family support. However, Saxena et al reported that the overall QoL scores of unmarried individuals were higher than those of married individuals.[65] Moreover, a study reported that marital status can affect mental health status, with married individuals having higher levels of anxiety than unmarried individuals.[66] In this study, it is considered as unmarried patients,

typically younger, and more receptive to new information, may possess stronger self-management abilities without the familial, and childcare responsibilities that married patients face, contributing to their heightened benefit-finding experiences. A higher sense of mastery, or the perceived control over what happens in one's personal life, is associated with better physical and mental health in other chronic diseases.[67] Some studies have also suggested a positive correlation between patients' benefit-finding, and family functioning,[68] but marital status may not influence benefit-finding if patients receive adequate family, and social support. Patients with comorbidities reported lower benefit-finding compared to those without comorbidities, likely due to the increased disease severity, multiple treatments, and recurrent episodes associated with comorbid conditions.[69,70] Comorbidities amplify physical, psychological, and economic burdens, making it more challenging for patients to fulfill their social roles, and thereby diminishing their perceived benefits. Patients covered by enterprise and institution medical insurance or enrolled in the New Rural Cooperative Medical Scheme exhibited higher benefit-finding than those with self-paid medical expenses, consistent with Lin's research.[71] Self-pay medical expenses impose significant financial strain on patients, and their families, hindering their ability to derive benefit from their experiences.

Correlation Between Mindfulness, SAQ, and Benefit-Finding

This study has unveiled a positive relationship between mindfulness, and benefit-finding in SLE patients. Those with heightened mindfulness exhibit a more positive self-perception, possess superior self-regulation, and emotional coping mechanisms to navigate adversity, and trauma, and demonstrate stronger adaptability, and interpersonal skills, leading to an enhanced quality of life, and overall well-being.[72,73] Mindfulness interventions could improve symptoms of depression, anxiety, perceived stress, and quality of life, with lasting effects extending up to six months.[74] Moreover, this study uncovered a positive correlation between mindfulness, and self-acceptance in SLE patients, aligning with findings indicating that individuals with higher levels of trait mindfulness tend to harbor higher core self-evaluations, and are more inclined to accept themselves non-critically.[75] Mindfulness training operates by mitigating self-critical attitudes, nurturing non-judgmental present-centered awareness, and fostering self-acceptance, and self-compassion.[76]

Furthermore, the observation, description, and non-reactivity dimensions of mindfulness were found to be positively associated with self-acceptance. The existence of a positive correlation between mindfulness, and self-evaluation (SAQ-SE) in SLE patients was confirmed in this study. The Mindful Coping Model posits that mindful individuals tend to centralize their stress assessments, perceive experiences with broader attention, and engage in flexible cognition, thereby enhancing cognitive reappraisal.[77] Consequently, individuals with heightened mindfulness are better equipped to adopt positive coping strategies, such as self-acceptance, and self-evaluation (including cognitive reappraisal), attentional switching (distraction), or attentional expansion, to regulate emotions, and buffer stress. Research has indicated that the core processes of mindfulness (description, and non-reactivity to experiences) are particularly pertinent to acceptance, and reappraisal as emotional regulation strategies, yielding positive outcomes.[78] Hence, it is recommended that clinical practitioners focus on patients' capacity to observe, describe, and react non-reactively in future mindfulness training sessions to enhance patients' self-acceptance, facilitate cognitive restructuring, alleviate negative emotions, alleviate clinical symptoms, and promote mental well-being.

In this study, self-acceptance (SAQ-SA) exhibited a positive correlation with benefit-finding, and its various dimensions. Ou et al found that patients who received Acceptance and Commitment Therapy (ACT) were better able to perceive benefits, detach themselves from problems, observe, learn, and overcome difficulties.[79] It can also help cancer patients accept negative changes related to their illness, and encourage them to recognize the benefits brought by their condition, thereby improving their quality of life.[80] Moreover, self-evaluation (SAQ-SE) was positively associated with benefit-finding in this study. Individuals often engage in cognitive reappraisal when confronted with stressful events during illness, a process that not only generates negative emotions but also explores the positive significance of the disease.[81] Positive reappraisal represents a coping mechanism, and adaptive process that reframes stressful events as benign, valuable, or beneficial.[16]

The Mediating Role of Self-Acceptance, and Self-Evaluation Between Mindfulness, and Benefit-Finding in SLE Patients

The findings of this study underscore the role of SAQ-SA among SLE patients, revealing its partial mediating effect in the relationship between mindfulness, and benefit-finding, with the mediation effect accounting for 7.95% of the total effect. This aligns with prior research indicating self-acceptance mediate mindfulness, and subjective well-being among college students. It was found that there is a positive correlation between perceived benefits, and subjective well-being.[82] Consequently, SAQ-SA emerges as a pivotal mechanism through which mindfulness can enhance the benefit-finding of SLE patients, with higher levels of mindfulness correlating with improved SAQ-SA, and greater benefit-finding, ultimately leading to better health outcomes, and reduced levels of perceived stress.[83]

Furthermore, this study revealed that self-evaluation (SAQ-SE) among SLE patients also plays a partial mediating role between mindfulness, and benefit-finding, accounting for 7.74% of the total effect. This mirrors findings from research on chronic pelvic pain, which demonstrated that mindfulness interventions can enhance cognitive processes such as positive cognitive reappraisal, and strengthen emotion regulation skills to mitigate stress, and mental-emotional dysfunction.[84] Patients with elevated mindfulness can not only directly experience positive effects on their perception of illness benefits but can also indirectly enhance such perceptions by bolstering their SAQ-SA, and SAQ-SE. Thus, clinical practitioners are encouraged to monitor patients' physical, and mental states, enhance their mindfulness levels, mitigate negative emotions through positive cognitive restructuring, bolster self-acceptance, implement cognitive reappraisal techniques, and thereby ameliorate the psychosomatic symptoms experienced by SLE patients.

Implications

Theoretical contributions of this study include: (1) Exploring the enhancing effects of mindfulness, and self-acceptance on the benefit-finding of patients through the lens of the Mindfulness Coping Model and delving into its mechanism in depth. (2) Establishing a theoretical framework of SAQ-SA, and SAQ-SE mediating benefit-finding, providing novel insights for a comprehensive analysis of the pathways shaping benefit-finding. Practical implications derived from the study are as follows: (1) Identification of key influencing factors, and target populations for interventions aimed at enhancing mindfulness, self-acceptance, and benefit-finding among SLE patients. (2) Highlighting the significant predictive power of mindfulness on individual benefit-finding, suggesting that appropriate mindfulness interventions can foster a positive outlook on living with the disease, and encourage patients to actively engage in treatment. (3) Recognition of the mediating effects of SAQ-SA, and SAQ-SE underscores the importance of nursing care workers in addressing SLE patients' coping strategies, focusing on fostering self-acceptance, and reappraisal of adverse stress to alleviate mood disturbances, reduce stress levels, and enhance overall quality of life. Based on the study's findings, it is found that improving mindfulness is an important means to improve the benefit-finding of SLE patients. Nursing workers can try to apply several mindfulness-based psychotherapy methods to SLE patients, such as Cognitive-Behavioral Therapy (CBT), Mindfulness-based stress reduction (MBSR), and ACT, etc. The benefit-finding of SLE patients can be improved by the following methods: (1) Cognitive therapy, such as group cognitive behavior theory,[85] mindfulness-based stress reduction (MBSR).[86] (2) Problem-solving or skill training. problem-solving therap,[87] coping skills training.[88] (3) Narrative therapy: writing, and expression therapy,[89] Mandala painting.[90] (4)Exercise therapy: muscle relaxation,[91] yoga.[92] (5) Other therapies: peer support,[93] Internet information support,[94] resourcefulness intervention,[95] etc. Current studies have shown that the methods to improve self-acceptance are limited, and one study found that improving mindfulness can affect their views of themselves, and others.[96] Storytelling may be a way to improve self-acceptance.[97] Yoga therapy may increase the acceptance of depression.[98] Self-acctance has a self-adaptive function, which can be expressed through the constant reduction of the tendency to stress, thus ensuring inner balance, and peace,[99] which is an important method to improve the patients' mental health. Further research should focus on finding effective ways to improve SLE patient's self-acceptance.

Conclusion

This study explored the influencing factors of mindfulness, self-acceptance, and benefit-finding among systemic lupus erythematosus (SLE) patients treated in a tertiary hospital in eastern China, including education levels, age, presence of other diseases besides SLE, medical expense payment method, monthly salary, and marital status. Additionally, this study confirmed the partial mediating effects of the SAQ-SA and SAQ-SE between mindfulness and benefit-finding, validating the Mindfulness Coping Model. Health professionals should enhance health education and psychological support for patients, highlighting their potential and cultivating mindfulness. Moreover, interventions should focus on improving patients' self-acceptance and cognitive reappraisal, ultimately enhancing their ability to find benefits in their disease experience. The findings of this study are enlightening for nursing professionals caring for SLE patients and other chronic disease patients. Future research directions could focus on improving the empirical effects of SAQ-SA and SAQ-SE between mindfulness and benefit-finding in SLE patients.

Study Limitations

There are several limitations of this study that need to be acknowledged. First, the use of convenience sampling may limit the representativeness of the sample and introduce potential sampling bias, thereby affecting the generalizability of the study results. Additionally, the cross-sectional design of this study limits the ability to determine causal relationships between variables. Second, the study was conducted only in five tertiary hospitals in the eastern region, which may affect the external validity of the study results and limit the applicability of the findings to other regions with different socioeconomic and demographic characteristics. Moreover, reliance on self-reported questionnaires may introduce the possibility of response bias. Lastly, the lack of empirical evidence from intervention studies highlights the need for future research to investigate the effectiveness of interventions aimed at improving benefit-finding in SLE patients. Despite these limitations, the strength of this study lies in identifying key populations for positive psychological interventions among SLE patients in eastern China. Specifically, individuals with lower educational levels, older age, multiple comorbidities, and self-payment for medical expenses exhibited lower benefit-finding. This underscores the importance of strengthening nursing assessments and interventions targeted at these key populations to improve their benefit-finding, particularly in terms of the SAQ-SA and SAQ-SE. Future research should delve deeper into the factors influencing benefit-finding in SLE patients and evaluate the impact of intervention studies on improving patient outcomes.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

This study adheres to the ethical principles outlined in the Declaration of Helsinki and was reviewed and approved by the Ethics Committee of Zhejiang Shuren University (Approval No. 20200105) to ensure compliance with ethical standards.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare that they have no conflicts of interest.

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