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ORIGINAL RESEARCH

The Association Between Psychological Capital and Self-Management Behaviors in Men with Gout: A Cross-Sectional Study in Southwest China

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Purpose: Gout is a common, chronic inflammatory joint disease, and men are more likely to suffer from gout. Improving patient self-management behaviors is a priority in gout healthcare. Psychological capital is associated with self-management behaviors in chronic diseases and can be improved through a number of interventions. However, this topic has not been well studied in gout patients. The aim of this study was to determine the level of psychological capital among male gout patients in Southwest China and to compare differences in self-management behaviors among patients with different levels of psychological capital.

Patients and Methods: This was a cross-sectional study. A total of 242 male gout patients were recruited from West China Hospital of Sichuan University, and demographic characteristics, clinical characteristics, psychological capital, and behavioral variables related to patient self-management were collected. K-Means cluster analysis was used to characterize psychological capital.

Results: The total psychological capital score of the participants was 134.5 (SD = 21.3). Cluster analysis of the four dimensions of psychological capital yielded three clusters, namely, Cluster 1 (higher level, 29.8%), Cluster 2 (moderate level, 52.3%), and Cluster 3 (poor level, 17.9%). The differences in the self-management behaviors among the three clusters, the differences were statistically significant. Post hoc analyses revealed that cluster 1 scored higher on the self-Management behaviors and its four dimensions than either cluster 2 or cluster 3 ($p < 0.05$).

Conclusion: The psychological capital of men with gout in Southwest China could be improved, and moderate and low levels of psychological capital are associated with suboptimal self-management behaviors. Healthcare providers may target gout patients with low or moderate levels of psychological capital as an intervention and take steps to improve their levels of psychological capital. These results may assist in decision-making for self-management behavioral interventions for gout patients.

Keywords: self efficacy, resilience, optimism, hope, cluster analysis

Introduction

Gout is a common chronic inflammatory joint disease that results from persistent elevations in serum uric acid (SUA) levels and the deposition of uric acid crystals in joints, tendons, and other tissues.[1] Gout has impact on patients' somatic function,[2] social activities,[2] psychology and quality of life,[2] and it also causes significant economic loss and medical burden.[3,4] The global prevalence of gout ranges from 0.03% to 15.30% and is gradually increasing.[1] Men are more likely to suffer from gout, and the Chinese Rheumatism Data Center (CRDC) reported that the ratio of male to female gout patients in China is 15:1.[5] Between 1990 and 2017, the prevalence and incidence of gout in China increased by 6.88% and 6.16%,[1] respectively, and the prevalence and incidence of gout in men in China increased by 7.07% and 6.46%,[1] respectively, during this period. Thus, male patients are a priority for gout management in China.

Received: 28 July 2024
Accepted: 30 December 2024
Published: 14 January 2025

The concept of treat-to-target (T2T) has been successfully applied to gout, and it is recommended that gout patients maintain SUA levels below 360 μmol/L for a long period of time to promote crystal dissolution and prevent acute attacks of gout.[6] To achieve this therapeutic goal, gout patients should take measures such as long-term adherence to uric acid-lowering therapy, lifestyle changes, reduction of high-purine foods, and maintenance of a positive mental state, which means that self-management inevitably becomes the main mode of disease management for gout patients. Self-management is defined in the medical field as a health behavior that maintains and promotes health, wellness and management of disease, and persistent treatment of one's disease through a number of behaviors[7] Self-management has now become a hot research topic in chronic disease management.[8–10] To the best of our knowledge, the self-management behavior of gout patients is not optimal,[3] the adherence to urate-lowering therapy(ULT) is only 47%,[11] and dietary control is also unsatisfactory.[12] Therefore improving patients' self-management behavior is also a focus of gout healthcare.

The implementation of self-management behavioral interventions presupposes an understanding of the factors associated with them. Previous studies have reported an association between chronic disease self-management behaviors and psychological factors.[13–16] Positive psychological capital, also known as psychological capital (PsyCap), comes from positive psychology and refers to the positive psychological state that emerges during an individual's growth process, including the four dimensions of self-efficacy, resilience, optimism, and hope.[17] Self-efficacy refers to a person's confidence in performing a challenging task. It represents a belief that the individual is capable of navigating the motivation, cognitive resources, and course of action required to successfully solve a given task.[18] Resilience is the ability to consistently overcome difficulties to succeed.[19] According to Rutter, resilience is the ability of individuals to successfully manipulate their environment to avoid negative consequences of adverse events.[19] Optimism refers to the positive attribution of current and possible future success. Optimism affects not only individuals' positive expectations for the future but also the coping strategies they choose.[20] Hope is the power to stick to a goal and adjust a path when necessary. People with high hope tend to be better at setting goals, resetting them in the face of adversity, and rationally using superior resources to achieve them.[18] These four concepts are independent, mutually reinforcing, and work together; in other words, individuals with high self-efficacy have hope for the future and relatively optimistic expectations for the future and are more resilient to adversity.[21] In recent years, PsyCap has been gradually applied in the field of health management.[22,23] A good positive psychology not only enables patients to face the disease correctly but also ensures that they deal with the disease correctly and make the right lifestyle choices for a rational lifestyle during the long-term progression of the disease. Previous quantitative studies have reported that PsyCap variables such as self-efficacy, resilience, optimism, and hope are associated with chronic disease self-management behaviors.[16,24–26] Furthermore, studies have confirmed that PsyCap can be enhanced by interventions.[27–29] Therefore, it can be hypothesized that understanding the PsyCap of gout patients may aid in the development of self-management intervention programs. However, worldwide research on PsyCap in gout patients has been limited. In addition, the dimensional characteristics of individual psychoanalysis are heterogeneous with different individual psychological manifestations. We need to further elucidate the potential characteristics of PsyCap in gout patients and the differences in self-management behaviors among gout patients with different psychological characteristics to quickly identify intervention targets and improve the efficiency of nursing practice. Cluster analysis, an analytical process in which sets of data objects are grouped into multiple classes composed of similar objects, is an effective method for determining the PsyCap characteristics of gout patients.

Therefore, the aim of this study was to evaluate the PsyCap levels of male gout patients in Southwest China to explore the potential characteristics of their PsyCap through cluster analysis and to analyze the differences in the self-management behaviors of gout patients with different psychological characteristics.

Materials and Methods

Study Design

This was a cross-sectional study using convenience sampling.

Sampling, Recruitment and Data Collection

There are no clear recommendations for sample size estimation for cluster analysis. Some studies recommend a minimum sample size of not less than 2^K (k = number of variables).[30] This study used the four dimensions of PsyCap as clustering variables, so the minimum sample size was $2^4 = 16$.

The study was conducted from February 2021 to January 2022 at West China Hospital of Sichuan University, a regional center hospital with patients mainly from the surrounding areas of Sichuan, Yunnan, and Guizhou. The inclusion criteria were (1) compliance with the 2015 American College of Rheumatology (ACR) and the European League Against Rheumatism (EULAR) diagnosis of gout by a rheumatologist,[5,31] (2) 18 years old and more, (3) ability to read and comprehend the questionnaire, and (4) participation. The exclusion criterion was cognitive or psychiatric abnormalities.

All participants were referred by a rheumatologist to participate in a 24-week randomized controlled trial of self-management for people with gout.[32] While in previous studies we have used baseline data from this program to explore the association between participants' psychosocial behaviors and quality of life,[33] the present study looks at participants' level of psychological capital and its association to self-management behaviors. Participants were first informed about the study and if they showed willingness, trained researchers informed participants about the purpose and the voluntary, anonymous nature of the study. All participants signed the informed consent form, were asked to independently complete a paper questionnaire, and were encouraged to seek help when needed. Submitted questionnaires were checked for completeness by the researcher. Data were manually entered by two researchers and checked.

Ethical Considerations

The study complied with the ethical guidelines of the 1975 Declaration of Helsinki and received ethical approval from the Medical Ethics Committee of West China Hospital in 2020 (ID: 2020898). All participants signed an informed consent form before the start of the study.

Instruments

Demographic and Clinical Characteristics

The demographic characteristics were self-reported by the participants, included age, body mass index (BMI), marital status, education, employment status, and monthly household income; and the clinical characteristics were extracted from the hospital information system, included disease course, SUA level, visual analog scale (VAS) score of joint pain in the past 6 months, comorbidities, ULT, and tophi status.

Psychological Capital

The Chinese version of the Positive PsyCap Questionnaire (PPQ) was used to assess participants' PsyCap.[17,21] Zhang et al validated a total Cronbach's alpha of 0.90.[21] The 26-item PPQ scores ranged from 1–7, and the total score ranged from 26–182, with higher scores indicating better PsyCap scores.[17,21] The PPQ consists of four dimensions: self-efficacy, resilience, optimism, and hope. In this study, Cronbach's alpha was 0.93.

Self-Management Behavior

The Gout Patient Self-Management Assessment Scale (GPSAS) was used to measure the participants' self-management behaviors.[34] Yao et al developed the scale and validated its Cronbach's alpha of 0.962 and a content validity index of 0.905.[34] The GPSAS scores of 41 items ranged from 1–5, with a total score of 41–205, with higher scores indicating better self-management behaviors.[34] The GPSAS consists of four dimensions, ie, disease treatment management, diet management, lifestyle management, and psychosocial management. In this study, Cronbach's alpha was 0.92.

Statistical Analysis

The data were analyzed using SPSS (version 25.0, IBM Corp). A one-sample K–S test was used to assess the normality of the data. Continuous variables are described using means (standard deviations) or medians (interquartile ranges) and categorical variables are expressed as frequencies and percentages.

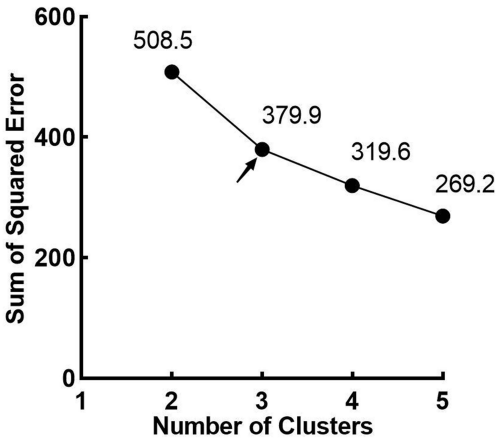

Figure 1 Number of clusters determined according to the elbow rule.

To categorize the data according to the four dimensions of the PPQ, we performed a k-means cluster analysis. We used the four dimensions of the PPQ as metrics, assuming a K of 2–5. The "Elbow rule" was used to review the calculation results, which showed that the optimal number of clusters was 3 (Figure 1).

Differences in demographic and clinical characteristics across PPQ clusters were analyzed by the chi-square test, one-way analysis of variance (ANOVA), the Kruskal–Wallis test or the chi–square test. Scores on the four dimensions of the PPQ and GPSAS were also compared across the three clusters using ANOVA. Post hoc Fisher's least significant difference test (LSD-t) was used to compare variables that differed significantly between the three clusters, and $P \leq 0.05$ was considered to indicate statistical significance.

Results

Demographic and Clinical Characteristics

In this study, 300 individuals were initially recruited, 242 of whom met the inclusion criteria. A total of 7 questionnaires were deleted due to the high level of duplication of all item options number; 235 questionnaires were included in the statistical analysis, and their demographic and clinical characteristics are listed in Table 1.

Identifying the Clusters of PsyCap

The total PPQ score of the participants was 134.5 (SD = 21.3), and the self-efficacy, resilience, optimism, and hope dimensions were 36.0 (SD = 6.5), 33.9 (SD = 6.9), 32.2 (SD = 5.8), and 32.5 (SD = 6.0), respectively. Cluster analysis revealed three PPQ clusters (Table 2), and the visualization results are shown in Figure 2. The three clusters obtained were cluster 1 (N=70, 29.8%), cluster 2 (N=123, 52.3%), and cluster 3 (N=42, 17.9%), where the total PPQ scores from highest to lowest were cluster 1 (159.9, SD=11.7), cluster 2 (130.5, SD=7.5), and cluster 3 (104.1, SD=9.3). The total PPQ and four-dimensional scores of the three clusters were significantly different ($p<0.001$). Fisher's LSD test was further used to determine significant differences between the two clusters ($p<0.001$). The demographic and clinical characteristics of the three different clusters are shown in Table 1. The differences in educational status, work status, and monthly household income of the participants were statistically significant ($p<0.05$). In terms of clinical characteristics, a statistically significant difference in disease course was observed ($p=0.026$).

Differences in the Characteristics and Levels of GPSAS Across the Three Clusters

Table 3 shows the differences in self-management levels across the three clusters. The GPSAS score for all participants was 145.5 (SD=26.5), and the scores for the four dimensions of disease treatment management, diet management, lifestyle management, and psychosocial management were 49.2 (SD=10.7), 41.9 (SD=9.0), 28.3 (SD=7.8), and 26.1 (SD=5.7), respectively. The total GPSAS score for Cluster 1 was 161.0 (SD=21.5), that for Cluster 2 was 140.7

Table 1 Demographic and Clinical Characteristics of the Participants and Differences Among the Three Clusters of the PPQ

Category	Range	Total (N=235)	Cluster 1 (N=70)	Cluster 2 (N=123)	Cluster 3 (N=42)	F/χ^2/H	*P*
Demographic characteristics							
Age(year), Mean(SD)	18–75	40.3(12.5)	38.1(10.7)	40.5(12.6)	43.3(14.39)	2.296[a]	0.103
BMI(kg/m^2), Mean(SD)	19.1–35.9	26.1(3.3)	25.6(3.3)	26.3(3.2)	26.2(3.5)	1.085[a]	0.340
Marital status, N(%)							
Single/Divorced/Widowed		56(23.8)	16(22.9)	33(26.8)	7(16.7)	1.833[b]	0.400
Married		179(76.2)	54(77.1)	90(73.2)	35(83.3)		
Education, N(%))							
Primary school		13(5.5)	4(5.7)	6(4.9)	3(7.1)	20.367[b]	**0.026**
Middle school		38(16.2)	8(11.4)	17(13.8)	13(31.0)		
High school		37(15.7)	7(10.0)	20(16.3)	10(23.8)		
Junior college		44(18.7)	17(24.3)	21(17.1)	6(14.3)		
Undergraduate		79(33.6)	23(32.9)	49(39.8)	7(16.7)		
Postgraduate		24(10.2)	11(15.7)	10(8.1)	3(7.1)		
Employment status, N(%)							
Employed		189(80.4)	61(87.1)	100(81.3)	28(66.7)	7.117[b]	**0.028**
Unemployed		46(19.6)	9(12.9)	23(18.7)	14(33.3)		
Monthly household income, (¥, CNY), N(%)							
<4000		70(29.8)	12(17.1)	38(30.9)	20(47.6)	22.83[b]	**<0.001**
4000–7999		74(31.5)	19(27.1)	38(30.9)	17(40.5)		
≥8000		91(38.7)	39(55.7)	47(38.2)	5(11.9)		
Clinical characteristic							
Disease Course(month), M(IQR)	0–490	59(96)	39(77.2)	60(88)	74(33.8)	7.331[c]	**0.026**
SUA(umol/L),Mean(SD)	154–818		479.0(123.2)	498.6(128.0)	452.1(135.3)	2.160[a]	0.118
Pain(VAS 0–10),Mean(SD)	0–10		5.2(2.6)	4.6(3.1)	4.7(3.3)	0.820[a]	0.442
Comorbidity, N (%)							
No		124(52.8)	36(51.4)	66(53.7)	22(52.4)	0.092[b]	0.955
Yes		111(47.2)	34(48.6)	57(46.3)	20(47.6)		
ULT, N (%)							
No		43(18.3)	13(18.6)	23(18.7)	7(16.7)	2.262[b]	0.688
Yes		189(80.4)	55(78.6)	99(80.5)	35(83.3)		
Missing value		3(1.3)	2(2.9)	1(0.8)	0(0.0)		
Tophi, N (%)							
No		162(72.0)	49(74.2)	85(72.7)	28(66.7)	0.782[b]	0.676
Yes		63(28.0)	17(25.8)	32(27.4)	14(33.3)		

Note:[a]one-way analysis of variance; [b]chi-square test; [c]Kruskal–Wallis test; the bold font: *P*≤0.05.

Abbreviations: PPQ, Positive PsyCap questionnaire; SD, standard deviation; M, median; IQR, interquartile range; BMI, body mass index; SUA, serum uric acid; VAS, visual analog scale; ULT, urate-lowering therapy.

(SD=25.6), and that for Cluster 3 was 133.9 (SD=25.7). Table 3 lists the four GPSAS dimension scores. The total GPSAS score and the four dimension scores for all clusters were significant ($p < 0.05$). Further post hoc analysis using Fisher's LSD test showed that the scores of the GPSAS and its four dimensions in cluster 1 were greater than those in cluster 2 or cluster 3 ($p < 0.05$). There was no significant difference between Cluster 2 and Cluster 3 except for the psychosocial management dimension ($p > 0.05$).

https://doi.org/10.2147/PPA.S473905

Table 2 PPQ Dimension Scores of the Three Clusters of PsyCap

PPQ Dimensions	Range	Total (N=235) Mean(SD)	Cluster 1 (N=70) Mean(SD)	Cluster 2 (N=123) Mean(SD)	Cluster 3 (N=42) Mean(SD)	Overall *P*	Cluster 1 VS Cluster 2 *P*	Cluster 1 VS Cluster 3 *P*	Cluster 2 VS Cluster 3 *P*
PPQ (total)	76–182	134.5(21.3)	159.9(11.7)	130.5(7.5)	104.1(9.3)	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Self efficacy	18–49	36.0(6.5)	42.2(4.9)	35.3(4.0)	27.7(3.6)	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Resilience	20–49	33.9(6.9)	40.3(6.1)	32.2(5.1)	27.9(4.2)	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Optimism	14–42	32.2(5.8)	38.6(3.0)	31.2(3.3)	24.7(3.9)	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Hope	16–42	32.5(6.0)	38.8(3.2)	31.8(3.2)	23.9(4.0)	**<0.001**	**<0.001**	**<0.001**	**<0.001**

Note: the bold font: $P \leq 0.05$.
Abbreviations: PPQ, Positive PsyCap questionnaire; PsyCap, psychological capital; SD, standard deviation.

Discussion

Gout is a chronic and lifelong condition and maintaining positive self-management behaviors is critical. Gout affects patients in a variety of ways and is often accompanied by adverse emotional experiences.[2–4] PsyCap is a concept of human strength and positive aspects, and individuals with higher PsyCap are more likely to overcome negative emotions and produce positive behaviors.[35–37] Therefore, we sought to determine the level of PsyCap in gout patients and whether it is associated with self-management behaviors.

We found that the PsyCap of gout patients was 134.5 (SD=21.3). Most of the previous PsyCap-related studies used quantitative research methods and could not consider the stratification of PsyCap levels. Through cluster analysis, we identified three PPQ clusters, cluster 1 (higher level), cluster 2 (moderate level), and cluster 3 (poor level). The total PPQ scores and dimensions of the study participants in the three clusters were significantly different, suggesting that the three clusters could distinguish between the three levels of PsyCap. This study also revealed that the majority of participants (70.2%) had poor or moderate levels of PsyCap, suggesting that the PsyCap levels of male gout patients in Southwest China need to be improved and that healthcare providers need to develop interventions to improve the PsyCap of gout patients.

We also found statistically significant differences in total GPSAS scores among the three clusters, with Cluster 1 scoring higher than Cluster 2 and Cluster 3, and similar results were observed across the four dimensions of GPSAS scores. This finding suggested that moderate and low levels of PsyCap may be associated with suboptimal self-management behaviors in gout patients. Previous studies have shown that one or more of the concepts in PsyCap are associated with self-management behaviors in patients with a number of chronic diseases such as diabetes, chronic kidney disease, and multiple sclerosis.[13–16,38] PsyCap can provide positive psychological support and can be reflected in personal behavior.[39] Those with a higher PsyCap may see it from a more positive perspective and have better resilience than those with a lower PsyCap. Luthans and others suggested that a number of models including main,

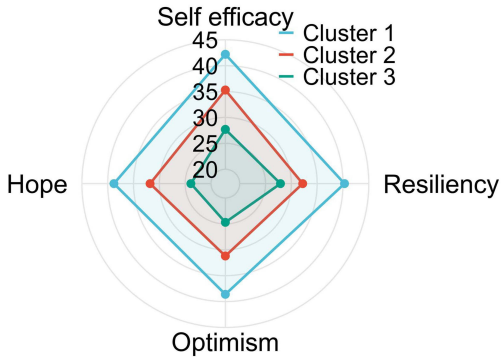

Figure 2 Visualization of the three clusters for the four subscales of PPQ.

Table 3 Level of Gout Self-Management Behavior Based on the Three Clusters of PPQ

Gout Patient Self-Management	Range	Total (N=235) Mean(SD)	Cluster 1 (N=70) Mean(SD)	Cluster 2 (N=123) Mean(SD)	Cluster 3 (N=42) Mean(SD)	Overall *P*	Cluster 1 VS Cluster 2 *P*	Cluster 1 VS Cluster 3 *P*	Cluster 2 VS Cluster 3 *P*
GPSAS(total)	56–201	145.5(26.5)	161.0 (21.5)	140.7(25.6)	133.9(25.7)	**<0.001**	**<0.001**	**<0.001**	0.120
Disease treatment management	15–65	49.2(10.7)	54.1 (9.6)	47.7(9.9)	45.0(11.9)	**<0.001**	**<0.001**	**<0.001**	0.141
Diet management	14–60	41.9(9.0)	45.8 (7.8)	40.7(9.0)	39.1(8.8)	**<0.001**	**<0.001**	**<0.001**	0.293
Lifestyle management	9–45	28.3(7.8)	30.7 (7.5)	27.2(8.1)	27.5(6.7)	**0.008**	**0.003**	**0.031**	0.856
Psychosocial management	7–35	26.1(5.7)	30.4 (4.2)	25.0(5.5)	22.3(4.0)	**<0.001**	**<0.001**	**<0.001**	**0.002**

Note: the bold font: $P \leq 0.05$.
Abbreviations: PPQ, Positive PsyCap questionnaire; GPSAS, gout patient self-management assessment scale; SD, standard deviation.

buffer, middle effects and dynamic effects models can influence outcomes and that these effects may be direct or indirect.[40–42] Our study also confirmed that PsyCap is associated with self-management behaviors in gout patients, which means that healthcare providers can use increasing PsyCap as a strategy to improve self-management behaviors in gout patients.

PsyCap, which includes self-efficacy, resilience, optimism, and hope,[17] can be a positive psychological resource for adhering to self-management behaviors. Previous studies have emphasized the relevance of self-efficacy and self-management in patients with chronic diseases.[13,38,43,44] In this study, the self-management behaviors of cluster 1 were significantly better than those of the other two clusters, clearly demonstrating the value of using self-efficacy as an intervention target. Individuals with chronic conditions who have high resilience are more likely to adopt positive self-management behaviors, a finding confirmed by our study.[15,44] Therefore, increasing the level of resilience may be beneficial for promoting self-management behaviors in gout patients. Wilski found that higher levels of optimism corresponded to greater self-management behavior.[16] This study also suggested that increasing the level of optimism in gout patients may be a way to improve their self-management behavior. Hope levels directly or indirectly influence self-management of chronic illness.[14,26] The present study also revealed that high hope was associated with high self-management behaviors in gout patients, suggesting that interventions targeting hope may help improve self-management behaviors in gout patients.

We also found that participants in the three groups differed in terms of educational status, employment status, income level and disease course. A study of patients with ischemic stroke have similar findings.[45] Future studies should explore the mechanisms by which these factors are associated with psychological capital in gout patients in order to develop interventions to improve their psychological capital.

This study has several limitations. First, these participants were recruited through convenience sampling. Therefore, the findings should be generalized with caution, and further multicenter studies are needed for validation. Second, this was a cross-sectional study, and the findings do not establish causal evidence. Longitudinal studies are needed to examine the role of PsyCap in self-management in gout patients. Third, this study used patient self-reported data, and the results are susceptible to recall bias.

Despite these limitations, the significance of this study is to compensate for the lack of attention to the psychological capital of gout patients in previous studies. We analyzed the PsyCap status of patients with gout and, through cluster analysis, classified PsyCap with multidimensional characteristics into three clusters and determined that low, medium, and intermediate levels of PsyCap were associated with suboptimal self-management behaviors.

Conclusion

In this study, we found that the PsyCap of gout patients still needs to be improved, and we divided the PsyCap of gout patients into three subgroups, in which moderate and lower levels of PsyCap corresponded to suboptimal self-management behaviors. Therefore, healthcare providers may intervene in gout patients with low, medium, and PsyCap levels and take certain measures to improve their PsyCap levels. These results may assist in decision-making for self-management behavioral interventions for gout patients.

Acknowledgments

The authors acknowledge gout patients who were involved in this study for providing feedback and data.

Funding

This work was supported by the SCST (Science and Technology of Sichuan Province) (Grant No.2018FZ0110 and No.2023JDR0251).

Disclosure

The authors report no conflicts of interest in this work.

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