Patient Preference and Adherence

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Mediating Effects of Health Literacy, Self-Efficacy, and Social Support on the Relationship Between Disease Knowledge and Patient Participation Behavior Among Chronic Ill Patients: A Cross-Sectional Study Based on the Capability-Opportunity-Motivation and Behavior (COM-B) Model

Minjuan Wu[1], Wenqin Wang[1], Hongmei He[2], Liyun Bao[2], Peier Lv[3]

[1]School of Medicine, Quzhou College of Technology, Quzhou, People's Republic of China; [2]Department of Nursing, The First People's Hospital of Lin'an District, Hangzhou, People's Republic of China; [3]Science and Education Department, The First People's Hospital of Lin'an District, Hangzhou, People's Republic of China

Correspondence: Peier Lv, The First People's Hospital of Lin'an District, No. 360 Yikang Street, Lin'an District, Hangzhou, 311301, People's Republic of China, Tel +8615868415548, Email lvpeier@126.com

Purpose: Patient participation is essential for improving patient safety and quality of care. It mainly refers to patients participating in their own healthcare through various ways, such as searching information on treatment options, engaging in decision-making, and communicating with healthcare professionals. This study aimed to investigate the relationships between disease knowledge, health literacy, self-efficacy, social support, and patient participation behavior in chronic ill patients based on the Capability-Opportunity-Motivation and Behavior (COM-B) model.

Methods: This cross-sectional survey, conducted from October 2023 to January 2024, involved 389 chronic ill patients from five clinical departments (cardiology, endocrinology, respiratory medicine, neurology, and geriatrics) at a tertiary hospital in Hangzhou, Zhejiang Province. Patients completed the health literacy management scale, general self-efficacy scale, core knowledge of chronic diseases questionnaire, social support rating scale, and patient participation scale. We used *t*-tests / ANOVA, Pearson's correlation coefficient, Fisher's z-test, linear regression, and mediation model to analyze data.

Results: The total effect of disease knowledge on patient participation behavior was significant ($\beta = 0.496$, $p < 0.001$), and the direct effect was also significant ($\beta = 0.144$, $p < 0.001$). Meanwhile, the relationship between disease knowledge and patient participation behavior was mediated by self-efficacy ($\beta = 0.043$, $p < 0.001$), health literacy ($\beta = 0.027$, $p < 0.001$), and social support ($\beta = 0.193$, $p < 0.001$), respectively.

Conclusion: This study proposed a conceptual model that includes the mediating effects of health literacy, self-efficacy, and social support, which helps clarify the underlying mechanisms between disease knowledge and patient participation behavior. Targeted interventions to increase disease knowledge, health literacy, self-efficacy, and social support can help chronic ill patients engage more actively in their own healthcare.

Keywords: self-efficacy, patient participation, health literacy, chronic diseases, social support

Introduction

Chronic diseases are significantly escalating the healthcare burden and are among the most prevalent and costly health issues. According to the World Health Organization, cardiovascular diseases, cancer, chronic respiratory diseases, and

Received: 20 December 2024
Accepted: 17 April 2025
Published: 8 May 2025

diabetes are responsible for more than 80% of early deaths resulting from chronic conditions.[1] These conditions are typically long-lasting and rarely curable, with their severity progressively worsening over time. In China, chronic diseases are responsible for 88.5% of all deaths and contribute to 84.9% of the national disease burden.[2] Chronic ill patients have to make numerous decisions throughout their lives due to the progressive nature of their conditions, which require them to consider various treatment options. For example, chronic ill patients have to make daily health-related decisions, such as taking medicine, making dietary adjustments, managing activity levels, and balancing health needs with work and social life.[3,4] They also need to decide when to seek medical help, manage their mental health, and use monitoring tools or assistive devices.[5,6] Previous studies have shown that participation in decision-making could improve the quality of life and result in better health outcomes for chronic ill patients.[7–9]

Patient participation behavior refers to the engagement of patients in decision-making and various aspects of their treatment and care,[10] including searching information on treatment options, communicating with healthcare professionals, self-monitoring, setting health goals, and providing feedback.[11–13] Previous studies showed that most chronic ill patients want to be involved in their care process, but their actual participation behavior was often lower than desired. Thus, more efforts are needed to improve chronic ill patients' participation behavior.[14–18]

Factors influencing patient participation behavior can be systematically categorized into intrapersonal factors (eg, knowledge, self-efficacy);[19,20] interpersonal factors (eg, social support, communication);[21,22] clinical situational factors (eg, hospital environment, healthcare providers);[23,24] and sociocultural factors (eg, race, personal beliefs).[25,26] Because of the healthcare system and cultural context in China, changing clinical situational and sociocultural factors quickly can be a challenge. Intrapersonal and interpersonal factors are more amenable to change given the complexity of chronic disease management, which requires full cooperation between patients and healthcare professionals. However, the impact and mechanisms of these factors on chronic ill patients' participation behavior remains unclear.

The Capability-Opportunity-Motivation and Behavior (COM-B) model provides a thorough framework for understanding health-related behaviors.[27] The COM-B model posits that behavior results from the interplay of capability, opportunity, and motivation, with the first two influencing behavior directly and indirectly through motivation.[27] Capability refers to either the physical or mental abilities (eg, knowledge, comprehension, and skills) needed to perform a behavior. Disease knowledge refers to one's ability to understand the definition, the causes, and the methods of treatment of his or her disease. The importance of disease knowledge in encouraging patients actively engage in their healthcare is widely recognized and is a central aim of most educational efforts.[28] Health literacy is defined as the ability to acquire, comprehend, and utilize information for making health-related decisions,[29] which plays a crucial role in individuals' capacity to actively participate in their own care. Therefore, consistent with the COM-B model, disease knowledge and health literacy are related to individual's ability to participate in their healthcare. Opportunities can manifest as either physical or social factors that facilitate or encourage a particular behavior. Social support, an important interpersonal factor that consists of support from family, friends, and healthcare professionals, can help reduce the negative emotions associated with the disease and increase confidence in making behavior changes.[30,31] Previous research has demonstrated that social support can enhance patients' competence in health information, thereby facilitating their active participation in healthcare.[32] In this study, we operationalized opportunity as the social support available to patients. Motivation is a broad concept that includes automatic mental processes, basic urges, and thoughtful cognitive processes, all of which can affect a person's likelihood to participate in specific behaviors. Self-efficacy, which refers to confidence in one's abilities,[33] is a key concept in Bandura's theory,[34] directly influencing an individual's views of behavior. Therefore, this study operationalizes motivation as the self-efficacy of an individual to take part in their care process.

To improve patient participation behavior in chronic ill patients, identifying influencing factors is crucial for designing effective, targeted interventions. Thus, the purposes of this study were as follows: First, to explore the correlations between disease knowledge, health literacy, self-efficacy, social support, and patient participation behavior. Second, to identify the mediating pathways that influence patient participation behavior.

Materials and Methods

Study Design and Participants

This cross-sectional study adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[35] Participants were recruited by convenience sampling from the outpatient clinic and inpatient wards at a tertiary hospital in Hangzhou, Zhejiang Province between October 2023 and January 2024. Inclusion criteria were: (1) $\geq$ 18 years old; (2) having at least one chronic health condition. Exclusion criteria included: (1) cognitive impairment or psychiatric disorders; (2) active cancer or life-threatening disease; (3) current or planned participation in another research study.

The sample size was calculated with G*Power (version 3.1) for linear multiple regression. Using a fixed model, R^2 deviation from zero, a small-to-medium effect size (f^2=0.10), an alpha of 0.05, a power of 0.95, and 6 predictors, the required sample was determined to be 215 participants. Accounting for a 20% dropout rate for invalid questionnaires and refusals, the adjusted sample size was 258. After excluding 21 questionnaires with missing data or patterned responses, 389 valid questionnaires were collected, yielding a valid response rate of 94.9%.

Measures

Demographic Information

Information about age, gender, education level, marital status, per capita family income (RMB), occupation, number of chronic diseases, way of payment, and reason for the visit was collected.

Health Literacy Management Scale (HeLMS)

Health literacy was assessed using the 29-item HeLMS.[36] This scale includes eight themes: five pertain to an individual's ability to get and utilize health information and services, while three address factors affecting these abilities. The dimensions are rated on a 5-point Likert scale (from 'no difficulty' to 'totally impossible'), with higher scores signifying greater health literacy. The HeLMS has been validated in Chinese patients, demonstrating good fit indices (Cronbach's α=0.894).[37]

Core Knowledge of Chronic Diseases Questionnaire

Disease knowledge was measured using the core knowledge of chronic diseases questionnaire issued by the Ministry of Health of the People's Republic of China in 2012.[38] It includes 10 items about chronic disease hazards, related risk factors, healthy lifestyles, indicators for regular medical checkups, chronic disease patient visits, cardiovascular disease prevention and treatment, cancer prevention and treatment, diabetes prevention and treatment, chronic respiratory prevention and treatment, and social responsibility for chronic disease prevention and control. The dimensions are rated on a 10-point Likert scale. Scores range from 0 to 100 points. A score below 60 indicates low chronic disease knowledge, while a score above 60 signifies high knowledge.[38]

General Self-Efficacy Scale (GSE)

Self-efficacy was assessed with the 10-item GSE,[39] rated on a 4-point Likert scale (from 'not at all true' to 'exactly true'), with lower scores indicating lower self-efficacy.[40] It has been translated into over 28 languages and has demonstrated cross-cultural validity and reliability. The internal consistency coefficient (Cronbach's α) for the Chinese version of the scale is 0.87.

Social Support Rating Scale (SSRS)

Social support was assessed using the SSRS, which consists of 10 items categorized into objective support (3 items), perceived support (4 items), and support utilization (3 items).[41] Scores range from 12 to 66, with below 35 indicating low support, 35–45 indicating moderate support, and above 45 indicating high support. The internal consistency coefficient (Cronbach's α) of the scale is 0.949.

Patient Participation Scale (PPS)

Patient participation behavior was assessed using the PPS.[42] It covered four factors, namely sharing of information and knowledge (8 items), performing autonomous self-management activities (7 items), establishing a mutual trust relationship (4 items), and partaking in the decision-making process (2 items). Patient participation is measured using a 5-point Likert scale (from 'strongly disagree' to 'strongly agree'), where higher scores indicate a higher level of participation. The internal consistency coefficient (Cronbach's α) in our study is 0.953.

Pilot Test

Among the five scales used in this study, the Patient Participation Scale (PPS) has not been extensively applied within the Chinese context. In contrast, the remaining four scales have been widely employed among chronic ill patients in China, demonstrating robust reliability and validity. Consequently, this study conducted a pilot test exclusively on the PPS. A pilot study was conducted in which 20 patients were recruited through convenience sampling. Each participant completed the PPS and subsequently provided feedback. Patients were interviewed regarding the comprehensibility and readability of the scale. As all participants reported that the items were clear and unambiguous, no further revisions were deemed necessary.

Data Collection

Clinical nurses from five clinical departments (cardiology, endocrinology, respiratory medicine, neurology, and geriatrics) screened eligible participants who met the inclusion criteria. Eligibility was verified by the primary investigator, after which five trained investigators (comprising five nursing students engaged in internships at this hospital) met with the patients who had initially consented to discuss the study. Participants were initially told that codes would replace their names in the data to ensure privacy. Participants who agreed to take part subsequently signed informed consent forms. All participants were fully informed about the purpose, procedure, and their rights in the data collection. In addition, participants were advised that they could discontinue the survey or withdraw their consent at any point during the study without facing any penalties. Furthermore, they were assured that the data collected would be exclusively used for research purposes.

The questionnaire content was accessed via a QR code through the WeChat Star questionnaire. Patients used their mobile phones to scan the QR code and complete the survey. In our study, the investigators' responsibilities were limited to distributing the QR code and offering neutral explanations, thereby ensuring that all responses were entirely self-reported and free from bias. When participants sought clarification on survey questions, researchers provided unbiased explanations. They received training to avoid employing leading language or exerting influence on responses. Ultimately, all responses were derived from the participants' individual judgments. Each participant spent approximately 15–20 minutes completing the questionnaire.

Ethical Considerations

The study received approval from the author's hospital ethics committee (ethics review document number: Research Ethics Review No. 19, 2023), and all participants gave written informed consent. Participants could withdraw at any time. All procedures complied with the Helsinki Declaration.

Statistical Analyses

Statistical analysis was conducted using SPSS (version 23.0). Continuous data are presented as mean and standard deviation (SD), while categorical data are summarized as frequency and percentage. Group differences were evaluated using t-tests or ANOVA. The Pearson correlation coefficient test was used to investigate the relationship between study variables, and Fisher's z test was used to compare the correlation coefficients. Multiple linear regression identified factors influencing patient participation behavior. We used Hayes's PROCESS macro (Model 6) to analyze the multiple mediation model.[43] Bootstrapping calculated the 95% confidence intervals (CIs), with mediation effects deemed significant if the 95% CIs did not include zero. Mediation effects and path differences were verified with $p < 0.05$ as statistically significant.

Data collection relied on self-reporting, which may introduce common method variance (CMV). Common method bias (CMB) represents a systematic error that can affect the validity of measures. To assess CMB, we conducted the Harman single-factor test, where the first factor explanatory variable below 40% indicates its absence.[44] The primary factor variance was 25.92%, below the critical value of 40%. Therefore, the data in this study are considered scientifically accurate.

Results

Participants Characteristics

The survey involved 389 participants with an average age of 52.26 ± 18.17 years (range 19–97), with the majority being female (55.01%). The majority were married (78.41%). Of the participants, 100 (25.71%) have a primary school education or below, 100 (25.71%) have a middle school education, 96 (24.68%) have a high school education, 87 (22.67%) have a college or bachelor's degree, and 6 (1.23%) have a master's degree or above. A total of 211 participants (54.24%) were employed. Regarding chronic diseases, 261 participants (67.1%) had one underlying condition. Patient participation behavior varied significantly based on per capita family income ($F = 2.559$, $p = 0.027$). Patients with a monthly family income of 7001–9000 CNY have the highest mean score (mean = 77.29, standard error [SE] = 10.43), followed by those earning 1001–3000 CNY (mean = 77.13, SE = 9.34), 5001–7000 CNY (mean = 76.19, SE = 11.60), over 9000 CNY (mean = 75.42, SE = 13.16), 3001–5000 CNY (mean = 75.12, SE = 10.83), and below 1000 CNY (mean = 75.12, SE = 10.83) (see Table 1). Patients with higher incomes seem more willing to participate in their care process, possibly due to greater access to resources and information.[45]

Description and Correlations of Study Variables

The average scores for disease knowledge, health literacy, social support, self-efficacy and patient participation behavior were 41.77 ± 9.64, 99.81 ± 13.67, 37.41 ± 9.81, 22.54 ± 5.54, and 76.48 ± 11.08, respectively. Pearson correlations indicated that disease knowledge was positively correlated with health literacy ($r = 0.114$, $p < 0.05$), social support ($r = 0.428$, $p < 0.01$), self-

Table 1 Description of Total Patient Participation Behavior Scores Among the Participants (N=389)

Variables	Categories	n	%	*M ± SD*	*t / F*	*p*
Sex	Male	175	44.99	75.76 ± 11.51	−1.165	0.328
	Female	214	55.01	77.07 ± 10.71		
Age (years)	19–30	66	16.97	76.67 ± 8.88	0.536	0.709
	31–40	44	11.31	77.39 ± 9.71		
	41–50	73	18.77	77.30 ± 10.22		
	51–60	71	18.25	74.90 ± 13.29		
	≥61	135	34.70	76.49 ± 11.69		
Education	Primary school or below	100	25.71	76.70 ± 10.65	0.785	0.535
	Middle school	100	25.71	76.87 ± 11.72		
	High school	96	24.68	74.92 ± 12.22		
	College or bachelor's degree	87	22.67	77.63 ± 9.42		
	Master's degree or above	6	1.23	74.83 ± 11.02		

(*Continued*)

Table 1 (Continued).

Variables	**Categories**	**n**	**%**	***M ± SD***	***t / F***	***p***
Marital status	Unmarried	61	15.68	74.79 ± 8.57	1.355	0.256
	Married	305	78.41	77.00 ± 11.56		
	Divorced	9	2.31	71.33 ± 8.09		
	Widowed	14	3.60	76.00 ± 11.08		
Essential worker status	Employed	211	54.24	77.07 ± 10.92	0.745	0.476
	Part time	25	6.43	74.84 ± 8.71		
	Unemployed or retired	153	39.33	75.95 ± 11.65		
Per capita family income, monthly (CNY)	<1000	23	6.92	70.74 ± 6.33	2.559	0.027
	1001–3000	62	15.94	77.13 ± 9.34		
	3001–5000	84	21.59	75.12 ± 10.83		
	5001–7000	98	25.19	76.19 ± 11.60		
	7001–9000	58	14.91	77.29 ± 10.43		
	>9001	64	16.45	75.42 ± 13.16		
Payment	Urban workers' medical insurance	186	47.81	76.85 ± 9.81	0.665	0.650
	Rural residents' medical insurance	93	23.91	76.57 ± 14.39		
	Rural cooperative medical insurance	102	26.22	76.00 ± 9.98		
	Commercial medical insurance	2	0.51	81.50 ± 12.02		
	Self-paying	1	0.26	N/A[a]		
	Others	5	1.29	72.00 ± 6.33		
Reason for the visit	Initial visit	149	38.30	76.52 ± 11.51	0.234	0.919
	Chronic disease management	140	35.99	76.56 ± 11.73		
	Routine physical examinations	52	13.37	77.10 ± 9.13		
	Reexamination	20	5.14	76.65 ± 9.02		
	Others	28	7.20	74.64 ± 10.57		
No. of chronic diseases	1	261	67.10	76.32 ± 10.67	0.109	0.896
	2	89	22.88	76.96 ± 10.19		
	≥3	39	10.02	76.51 ± 15.28		

Note: F, one-way ANOVA; *t*, Student's *t* test. [a]M ± SD cannot be calculated for this item.

efficacy (r = 0.417, p < 0.01), and patient participation behavior (r = 0.435, p < 0.01) (see Table 2). The correlation coefficient between disease knowledge and social support was significantly greater for males than for females (z = 2.462, p = 0.007). Similarly, the correlation coefficient between disease knowledge and self-efficacy was significantly higher for males compared to females (z = 1.690, p = 0.046). All other comparisons were not significant (see Table 3).

Table 2 Descriptive Statistics and Correlation of Study Variables (N=389)

Variables	*M ± SD*	1	2	3	4	5
1. Disease knowledge	41.77±9.64	1	–	–	–	–
2. Health literacy	99.81±13.67	0.114*	1	–	–	–
3. Social support	37.41±9.81	0.428**	0.194**	1	–	–
4. Self-efficacy	22.54±5.54	0.417**	0.225**	0.704**	1	-
5. Patient participation behavior	76.48±11.08	0.435**	0.362**	0.684**	0.648**	1

Note: *p<0.05; **p<0.01.

Table 3 Results of Testing the Correlation Coefficients of Study Variables by Gender

	Male (r)	Female (r)	z Score	*p*
Disease knowledge versus health literacy	0.103	0.125	−0.217	0.414
Disease knowledge versus social support	0.538	0.335	2.462	0.007
Disease knowledge versus self-efficacy	0.494	0.352	1.690	0.046
Disease knowledge versus patient participation behavior	0.447	0.421	0.312	0.378
Health literacy versus social support	0.190	0.197	−0.071	0.472
Health literacy versus self-efficacy	0.247	0.205	0.431	0.333
Health literacy versus patient participation behavior	0.327	0.402	−0.843	0.200
Social support versus self-efficacy	0.683	0.717	−0.650	0.258
Social support versus patient participation behavior	0.689	0.679	0.183	0.427
Self-efficacy versus patient participation behavior	0.661	0.637	0.404	0.343

Note: There were 10 tests, and the significant alpha level was 0.05/10 = 0.005.

Linear Regression Analysis of Patient Participation Behavior

To identify factors associated with patient participation behavior, linear regression analysis was performed (see Table 4). No multicollinearity issues were found among the study variables. In Model 2, disease knowledge had a positive correlation with patient participation behavior ($\beta = 0.431$, $p < 0.001$) after controlling for demographic factors. In Model 3, with the inclusion of health literacy ($\beta = 0.236$, $p < 0.001$), social support ($\beta = 0.396$, $p < 0.05$), and self-efficacy ($\beta = 0.274$, $p < 0.001$), the effect of disease knowledge on patient participation behavior weakened ($\beta = 0.121$, $p < 0.001$). This suggests that health literacy, social support, and self-efficacy might mediate the link between disease knowledge and patient participation behavior.

Testing for Mediation Effect

A mediation analysis was performed with per capita family income as a control variable (see Table 5 and Figure 1). The results revealed that disease knowledge had a direct effect ($\beta = 0.144$, $p < 0.001$) and a total indirect effect ($\beta = 0.352$, $p < 0.001$) via health literacy, social support, and self-efficacy on patient participation behavior, with the total effect ($\beta = 0.496$, $p < 0.001$). When health literacy, social support, and self-efficacy were added to the regression equation, disease knowledge was a positive predictor of health literacy ($\beta = 0.152$, $p < 0.05$), social support ($\beta = 0.419$, $p < 0.001$), and self-efficacy ($\beta = 0.081$, $p < 0.001$). Disease knowledge significantly predicted patient participation behavior ($\beta = 0.496$,

Table 4 Linear Regression Analysis of Patient Participation Behavior (N=389)

Variables	Model 1			Model 2			Model 3		
	β	*t*	*p*	β	*t*	*p*	β	*t*	*p*
Constant	–	15.613	<0.001	–	11.023	<0.001	–	5.028	<0.001
Sex	0.059	1.150	0.251	0.036	0.778	0.437	0.001	0.033	0.974
Age	−0.010	−0.125	0.901	−0.052	−0.746	0.456	−0.016	−0.321	0.748
Education	−0.083	−1.210	0.227	−0.035	−0.571	0.569	−0.053	−1.163	0.246
Marital status	0.026	0.427	0.669	0.024	0.452	0.651	0.021	0.535	0.593
Essential worker status	−0.027	−0.387	0.699	0.013	0.210	0.834	0.033	0.722	0.471
Per capita family income	0.155	2.700	0.007	0.124	2.391	0.017	−0.013	−0.341	0.733
Payment	−0.030	−0.528	0.598	−0.044	−0.842	0.400	−0.005	−0.125	0.901
Reason for the visit	−0.035	−0.685	0.494	−0.005	−0.117	0.907	0.019	0.546	0.585
No. of chronic diseases	0.031	0.559	0.576	0.049	0.972	0.332	0.009	0.256	0.798
Disease knowledge				0.431	9.307	<0.001	0.121	3.196	0.002
Health literacy							0.236	6.345	<0.001
Social support							0.396	8.106	<0.001
Self-efficacy							0.274	5.642	<0.001
R^2	0.011			0.781			0.823		
Adjusted R^2	0.009			0.776			0.817		

Note: β, standardized beta.

Table 5 Mediation Analysis of Disease Knowledge and Patient Participation Behavior (N=389)

Effect	Paths	β	SE	95% CI
Total effect	–	0.496	0.052	[0.393, 0.598]
Total Indirect effect	–	0.352	0.042	[0.274, 0.442]
Direct effect	Disease knowledge → patient participation behavior	0.144	0.043	[0.059, 0.228]
Indirect effect 1	Disease knowledge → health literacy → patient participation behavior	0.027	0.014	[0.006, 0.057]
Indirect effect 2	Disease knowledge → social support → patient participation behavior	0.193	0.030	[0.137, 0.254]
Indirect effect 3	Disease knowledge → self-efficacy → patient participation behavior	0.043	0.015	[0.017, 0.077]
Indirect effect 4	Disease knowledge → health literacy → social support → patient participation behavior	0.006	0.003	[0.001, 0.013]
Indirect effect 5	Disease knowledge → health literacy → self-efficacy → patient participation behavior	0.003	0.002	[0.001, 0.007]
Indirect effect 6	Disease knowledge → social support → self-efficacy → patient participation behavior	0.078	0.019	[0.045, 0.119]
Indirect effect 7	Disease knowledge → health literacy → social support → self-efficacy → patient participation behavior	0.002	0.001	[0.001, 0.006]

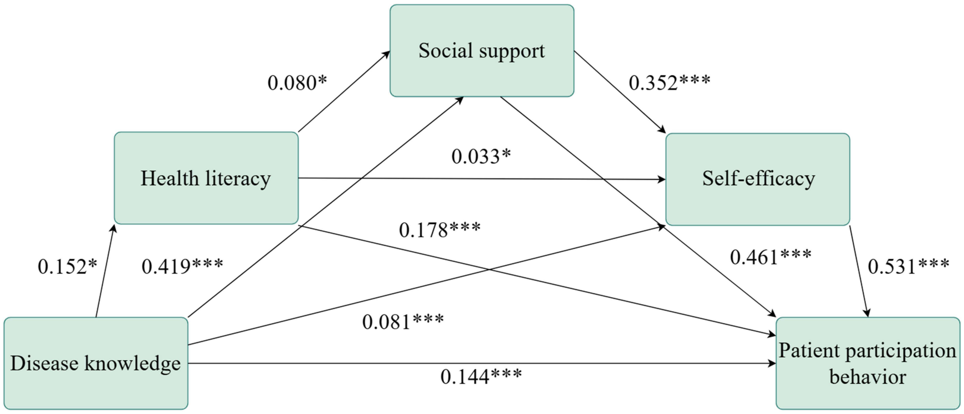

Figure 1 The multiple mediation effect of health literacy, social support, and self-efficacy linking disease knowledge and patient participation behavior.
Note: *$p<0.05$; ***$p<0.001$.

p < 0.001). After including health literacy, social support, and self-efficacy, disease knowledge still significantly predicted patient participation behavior (β = 0.144, p < 0.001).

Discussion

This study used the COM-B model to analyze how disease knowledge, health literacy, social support, and self-efficacy mediate patient participation behavior among chronic ill patients. The results showed that disease knowledge was positively related to patient participation behavior through four indirect pathways: (1) a relationship mediated by health literacy; (2) a relationship mediated by social support; (3) a relationship mediated by self-efficacy; (4) a relationship serially mediated by health literacy, social support, and self-efficacy. These findings have important implications for clinical practice. For example, healthcare professionals can design educational interventions to improve disease knowledge in chronic ill patients, enhancing their health literacy and enabling better understanding of medical instructions and treatment decisions. An increase in disease knowledge also helps patients recognize the value of seeking professional guidance and boosts their confidence in managing their condition, which promotes active participation in their healthcare. Additionally, fostering social support networks and increasing self-efficacy through targeted strategies can further strengthen the positive impact of disease knowledge on patient participation behavior, ultimately improving health outcomes.

Capability and Patient Participation Behavior

Our results demonstrated that disease knowledge significantly influenced patient participation behavior both directly and indirectly, aligning with the COM-B model. The Knowledge-Attitude-Practice (KAP) theory asserts that knowledge serves as a prerequisite for action. Patients with chronic disease knowledge had stronger beliefs about their illness and greater motivation to adopt correct behaviors and practices.[46,47] The significance of disease knowledge in enhancing patient participation in healthcare is well-established and is a key objective of most educational interventions.[28] However, patients in our study exhibited low knowledge of chronic diseases, which may hinder their participation behavior. Previous studies have shown that chronic ill patients have high expectations for comprehensive disease knowledge, and education can enhance their self-efficacy.[48–50] Effective chronic disease education should offer knowledge and boost motivation.[51] Additionally, we found gender differences in the relationships between disease knowledge, social support, and self-efficacy. To maximize impact, future disease education initiatives should consider this gender difference.

Health literacy reflects an individual's ability and confidence to manage their disease and maintain health,[29,52] thus influencing their participation behavior. Higher levels of health literacy was associated with greater patient participation behavior, aligning with previous research.[10] Additionally, health literacy can enhance social support and self-efficacy.[53] Patients with high health literacy communicate more effectively, increasing interactions and reshaping social networks, thereby boosting social support.[54] More support from family, friends, or society enhances exposure to verbal encouragement about health-related behaviors, improving self-efficacy.[54] Our study found that health literacy impacts patient participation behavior through the mediation of social support and self-efficacy, consistent with the COM-B model. These results indicate that policymakers and healthcare professionals should target patients with low health literacy to enhance their participation behavior by improving their health literacy.

Opportunity and Patient Participation Behavior

Our findings showed that social support mediates the relationship between disease knowledge and patient participation behavior, aligning with the COM-B model. Greater disease knowledge prompts patients to seek social support, aiding in the adoption of positive coping strategies, improving health management, and enhancing self-efficacy.[55] In this study, social support includes healthcare professionals, family, friends, and others. Healthcare professionals are a key source of emotional and informational support.[56] Given the Chinese cultural context, patients often rely heavily on healthcare professionals for information and communication support.[57] Thus, healthcare professionals should offer personalized support to chronic ill patients to encourage their engagement in healthcare.

Motivation and Patient Participation Behavior

Our results confirmed that self-efficacy is a key psychological factor positively linked to patient participation behavior, consistent with the COM-B model and previous studies.[58] Based on Bandura's social learning theory, self-efficacy is an individual's belief in their abilities, influenced by personal expectations and goals.[59] High self-efficacy can improve treatment adherence in chronic ill patients. This study measured chronic ill patients' self-efficacy regarding their participation behavior. Previous research has identified self-efficacy as the strongest correlate of patient participation behavior.[60] While self-efficacy as a mediator between disease knowledge and patient participation behavior has been shown in other diseases,[58] this study is the first to report its mediation between health literacy, social support, and participation behavior, warranting further validation.

Other Factors Related to Patient Participation Behavior

Income could affect patient participation behavior, consistent with previous studies among cancer patients.[61] Possible explanations for this finding were that chronic diseases requiring lifelong treatment and incur high medical expenses, making income a factor that influences treatment options and participation autonomy. Developing and implementing interventions, especially for socially and economically disadvantaged groups, can help reduce inequality in this area.

Strengths and Limitations

This study investigated the relationship between disease knowledge, health literacy, social support, self-efficacy, and patient participation behavior based on the COM-B model. While previous studies have examined the influence of disease knowledge, health literacy, social support, and self-efficacy on patient participation behavior,[29,52,60] this study is the first to investigate the interactions among these factors in chronic ill patients. The identification of four indirect pathways through which disease knowledge influences patient participation behavior offers a comprehensive understanding of the complex factors involved. Meanwhile, this study identified economic factors, particularly family income, as significant determinants of patient participation behavior, underscoring the necessity of addressing financial barriers to engage patients in healthcare, particularly among socially and economically disadvantaged groups like elderly and disabled people. However, there are several limitations. First, this study utilizes a cross-sectional design, which limits its ability to explain causal relationships between variables. To substantiate these causal relationships, future research employing longitudinal or experimental methodologies is necessary. Second, since participants were recruited from a single tertiary hospital, the findings may not be generalizable to patients in other regions. While we included several demographic subgroups (eg, age, gender, family income) to improve representativeness, multi-center studies with broader geographic sampling are warranted. Third, we employed validated scales to minimize measurement error and ensured anonymity to decrease subjective bias; however, self-reported questionnaires may still introduce bias. Fourth, we analyzed the total patient participation behavior scores among participants with different numbers of chronic diseases; however, we did not find a difference between those with one type, two types, and three or more types. Due to an insufficient sample size, our study did not systematically assess the potential influence of concurrent chronic illnesses on patient participation behavior. Future studies with larger sample sizes should incorporate detailed assessments of comorbidities, such as stratified analyses, to better describe their role in patient participation behavior. Fifth, it is known that education has considerable impact on health literacy, which could further affect patient participation behavior. Since our data was collected from a tertiary hospital in Hangzhou, an economically prosperous city in eastern China, the average education level of its population is higher than that of cities in the central and western regions. The extent to which these findings can be generalized to chronic ill patients in other regions remains uncertain.

Practical Implications

There are both theoretical and practical implications for improving patient participation behavior among chronic ill patients. First, the mediating roles of health literacy, self-efficacy, and social support between disease knowledge and patient participation behavior in chronic ill patients were explored in this study. The mediation model suggests that a combined intervention of disease knowledge, health literacy, self-efficacy, and social support may be more effective in encouraging chronic ill patients to participate in their healthcare. Second, disease knowledge is critical for patient participation behavior among chronic ill patients. It is important to design targeted and feasible strategies to enhance disease knowledge. Disease-related knowledge education needs to align with the characteristics of chronic ill patients. The integration of multidisciplinary knowledge, such as risk factors, clinical medicine, and healthy lifestyles, can be regarded as a means to enhance the effectiveness of educational interventions. In the development of interventions aimed at enhancing disease knowledge, it is crucial to take into account patients' health literacy capabilities. To optimize the effectiveness of these interventions, educational strategies for disease knowledge should be integrated with health literacy intervention strategies. Meanwhile, increasing self-efficacy level is an important measure to improve patient participation behavior in chronic ill patients. Self-efficacy intervention programs should be consistently conducted to enable chronic ill patients to participate more actively in their healthcare. Moreover, in addition to offering professional support, healthcare professionals should also raise awareness among family members (or friends) about the essential role of peer support. Lastly, as gender and economic inequality were identified as a potential barrier to patient participation in their healthcare in this study, healthcare professionals should pay special attention to female and economically disadvantaged patients.

Conclusion

This study identified the factors that affect patient participation behavior among chronic ill patients. The results showed that health literacy, self-efficacy, and social support were multiple mediators of the relationship between disease knowledge and patient participation behavior. To encourage patients to actively participate in their healthcare, disease-related knowledge education from health professionals is crucial. In particular, the results showed that health literacy had a significant effect on patient participation behavior, indicating that higher levels of health literacy are associated with higher levels of participation in healthcare. Therefore, educational interventions should be designed to align content and delivery methods with each patient's health literacy capabilities. Simultaneously, considering the influence of social support and self-efficacy on patient participation behavior, healthcare professionals should implement interventions designed to enhance patients' self-efficacy and provide professional support. Additionally, they should also strive to raise awareness among family members and friends about the critical role of peer support. Lastly, during the intervention process, healthcare professionals should pay more attention to female and economically disadvantaged patients.

Data Sharing Statement

The raw data supporting the conclusions of this article will be made available by the corresponding author on request.

Ethics Statement

This study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of The First People's Hospital of Lin'an District (ethics review document number: Research Ethics Review No. 19, 2023).

Funding

This study was supported by Agricultural and Social Development Research Guidance Project of Lin'an District (2022Y12) and Hospital-level project of The First People's Hospital of Lin'an District (LY2024003K).

Disclosure

The authors report no conflicts of interest in this work.

References

1. World Health Organization (WHO). Noncommunicable diseases. [Online]. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases. Cited 2024 November 24.
2. Su B, Guo S, Zheng X. Transitions in chronic disease mortality in china: evidence and implications. *China CDC Weekly*. 2023;5(50):1131–1134. doi:10.46234/ccdcw2023.211
3. Lorig KR, Holman H. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behavi Med*. 2003;26(1):1–7. doi:10.1207/S15324796ABM2601_01
4. Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. *JAMA*. 2002;288(19):2469–2475. doi:10.1001/jama.288.19.2469
5. Williams A, Manias E, Walker R. Interventions to improve medication adherence in people with multiple chronic conditions: a systematic review. *J Adv Nurs*. 2008;63(2):132–143. doi:10.1111/j.1365-2648.2008.04656.x
6. Gallant MP. The influence of social support on chronic illness self-management: a review and directions for research. *Health Educ Behav*. 2003;30(2):170–195. doi:10.1177/1090198102251030
7. Houska A, Tučková A, Vlčková K, Poláková K, Loučka M. Optimal participation in decision-making in advanced chronic disease: perspectives of patients, relatives and physicians. *Ann Palliative Med*. 2021;10(4):3951–3959. doi:10.21037/apm-20-2368
8. Nwankwo L, McLaren K, Donovan J, et al. Utilisation of remote capillary blood testing in an outpatient clinic setting to improve shared decision making and patient and clinician experience: a validation and pilot study. *BMJ Open Quality*. 2021;10(3):e001192. doi:10.1136/bmjoq-2020-001192
9. Kovoor JG, McIntyre D, Chik WWB, Chow CK, Thiagalingam A. Clinician-created educational video resources for shared decision-making in the outpatient management of chronic disease: development and evaluation study. *J Med Internet Res*. 2021;23(10):e26732. doi:10.2196/26732
10. Won MH, Shin SH. Mediating effects of patient safety perception and willingness to participate in patient safety on the relationship between health literacy and patient participation behavior among inpatients. *Front Public Health*. 2024;12:1349891. doi:10.3389/fpubh.2024.1349891
11. Cahill J. Patient participation--a review of the literature. *J Clin Nurs*. 1998;7(2):119–128. doi:10.1111/j.1365-2702.1998.00132.x
12. Thórarinsdóttir K, Kristjánsson K. Patients' perspectives on person-centred participation in healthcare: a framework analysis. *Nurs Ethics*. 2014;21(2):129–147. doi:10.1177/0969733013490593
13. Sahlsten MJ, Larsson IE, Sjöström B, Plos KA. An analysis of the concept of patient participation. *Nurs Forum*. 2008;43(1):2–11. doi:10.1111/j.1744-6198.2008.00090.x
14. Ratanasuwan T, Indharapakdi S, Promrerk R, Komolviphat T, Thanamai Y. Health belief model about diabetes mellitus in Thailand: the culture consensus analysis. *J Med Assoc*. 2005;88(5):623–631.
15. Frosch DL, Rincon D, Ochoa S, Mangione CM. Activating seniors to improve chronic disease care: results from a pilot intervention study. *J Am Geriatric Soc*. 2010;58(8):1496–1503. doi:10.1111/j.1532-5415.2010.02980.x
16. Millaruelo Trillo JM. Importance of patient involvement in disease self-management: the expert patient. Role of new technologies to support patient autonomy. *Aten Primaria*. 2010;42(Suppl 1):41–47. doi:10.1016/S0212-6567(10)70007-X
17. Vestala H, Frisman GH. Can participation in documentation influence experiences of involvement in care decision-making? *Open Nurs J*. 2013;7:66–72. doi:10.2174/1874434620130516002
18. Iyngkaran P, Toukhsati SR, Harris M, et al. Self managing heart failure in remote Australia - translating concepts into clinical practice. *Curr Cardiol Rev*. 2016;12(4):270–284. doi:10.2174/1573403X12666160703183001
19. Katz MG, Jacobson TA, Veledar E, Kripalani S. Patient literacy and question-asking behavior during the medical encounter: a mixed-methods analysis. *J Gen Inter Med*. 2007;22(6):782–786. doi:10.1007/s11606-007-0184-6
20. Maly RC, Umezawa Y, Leake B, Silliman RA. Determinants of participation in treatment decision-making by older breast cancer patients. *BCR*. 2004;85(3):201–209. doi:10.1023/B:BREA.0000025408.46234.66
21. Giunta S, Laidsaar-Powell R, Huang L, et al. Considering the type and timing of breast reconstruction after mastectomy: qualitative insights into women's decision-making. *Europ J Oncol Nurs*. 2021;54:102024. doi:10.1016/j.ejon.2021.102024
22. Obeidat R. Decision-making preferences of Jordanian women diagnosed with breast cancer. *Support Care Cancer*. 2015;23(8):2281–2285. doi:10.1007/s00520-014-2594-4
23. McGuckin M, Waterman R, Porten L, et al. Patient education model for increasing handwashing compliance. *Am J Infec Control*. 1999;27(4):309–314. doi:10.1016/S0196-6553(99)70049-0
24. Xiao L, Miao J, Peng M, et al. The effect of health literacy on patient's perceived shared decision-making among Chinese cancer patients. *Psycho-Oncol*. 2022;31(1):70–77. doi:10.1002/pon.5777
25. Bettes BA, Coleman VH, Zinberg S, et al. Cesarean delivery on maternal request: obstetrician-gynecologists' knowledge, perception, and practice patterns. *Obstet Gynecol*. 2007;109(1):57–66. doi:10.1097/01.AOG.0000249608.11864.b6
26. Guevara JP, Wolf FM, Grum CM, Clark NM. Effects of educational interventions for self management of asthma in children and adolescents: systematic review and meta-analysis. *BMJ*. 2003;326(7402):1308–1309. doi:10.1136/bmj.326.7402.1308
27. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Imple Sci*. 2011;6(1):42. doi:10.1186/1748-5908-6-42

28. Heumann M, Röhnsch G, Zabaleta-Del-Olmo E, Toso B, Giovanella L, Hämel K. Barriers to and enablers of the promotion of patient and family participation in primary healthcare nursing in Brazil, Germany and Spain: a qualitative study. *Health Expect*. 2023;26(6):2396–2408. doi:10.1111/hex.13843
29. Garcia CH, Espinoza SE, Lichtenstein M, Hazuda HP. Health literacy associations between Hispanic elderly patients and their caregivers. *J Health Comm*. 2013;18(Suppl 1):256–272. doi:10.1080/10810730.2013.829135
30. Tovar EG, Dekker RL, Chung ML, et al. Self-efficacy mediates the relationship of depressive symptoms and social support with adherence in patients with heart failure. *J Health Psychol*. 2016;21(11):2673–2683. doi:10.1177/1359105315583369
31. Al-Dwaikat TN, Rababah JA, Al-Hammouri MM, Chlebowy DO. Social support, self-efficacy, and psychological wellbeing of adults with type 2 diabetes. *West J Nurs Res*. 2021;43(4):288–297. doi:10.1177/0193945920921101
32. Guan M, Han JY, Shah DV, Gustafson DH. Exploring the role of social support in promoting patient participation in health care among women with breast cancer. *Health Commun*. 2021;36(13):1581–1589. doi:10.1080/10410236.2020.1773704
33. Bandura A. Social cognitive theory: an agentic perspective. *Ann Rev Psychol*. 2001;52(1):1–26. doi:10.1146/annurev.psych.52.1.1
34. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psycholog Rev* 1977;84(2):191–215. doi:10.1037/0033-295X.84.2.191
35. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *J Clin Epidemiol*. 2008;61(4):344–349. doi:10.1016/j.jclinepi.2007.11.008
36. Jordan JE, Buchbinder R, Briggs AM, et al. The health literacy management scale (HeLMS): a measure of an individual's capacity to seek, understand and use health information within the healthcare setting. *Patient Educ Counsel*. 2013;91(2):228–235. doi:10.1016/j.pec.2013.01.013
37. Sun H, Peng H, Fu H. The reliability and consistency of health literacy scale for chronic patients. *Fudan Univ J*. 2012;03:268–272.
38. Guo KM, Dong WL, Dong JQ, et al. Analysis of the core knowledge level of chronic diseases in Chinese adults and related factors. *Zhonghua Yu Fang Yi Xue Za Zhi*. 2023;57(4):550–556. doi:10.3760/cma.j.cn112150-20220513-00478
39. Luszczynska A, Gutiérrez-Doña B, Schwarzer R. General self-efficacy in various domains of human functioning: evidence from five countries. *Inter J Psychol*. 2005;40(2):80–89. doi:10.1080/00207590444000041
40. Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. *J Psychol Interdisciplin Appl*. 2005;139(5):439–457. doi:10.3200/JRLP.139.5.439-457
41. Xiao S.Theoretical basis and research application of social support rating scale. *J Clin Psych*. 1994;4(2):3.
42. Song M, Kim M. Development and validation of a patient participation scale. *J Adv Nurs*. 2023;79(6):2393–2403. doi:10.1111/jan.15593
43. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based Approach: introduction to mediation, moderation, and conditional process analysis: a regression-based approach. 2013.
44. Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J Appl Psychol*. 2003;88(5):879–903. doi:10.1037/0021-9010.88.5.879
45. Edelman M, Jellema P, Hak E, Denig P, Blanker MH. Patients' attitudes towards deprescribing alpha-blockers and their willingness to participate in a discontinuation trial. *Drugs & Aging*. 2019;36(12):1133–1139. doi:10.1007/s40266-019-00712-6
46. Almheiri A, Binjab EA, Albloushi MM, et al. Knowledge, attitude and practices of insulin therapy among patients with type 2 diabetes: a cross-sectional study. *BMJ Open*. 2024;14(3):e079693. doi:10.1136/bmjopen-2023-079693
47. Ibrahim Abougalambou SS, AbaAlkhail H, Abougalambou AS. The knowledge, attitude and practice among diabetic patient in central region of Saudi Arabia. *Diabetol Metab Syndr*. 2019;13(5):2975–2981. doi:10.1016/j.dsx.2019.07.049
48. Ingadottir B, Thylén I, Jaarsma T. Knowledge expectations, self-care, and health complaints of heart failure patients scheduled for cardiac resynchronization therapy implantation. *Patient Prefer Adher*. 2015;9:913–921. doi:10.2147/PPA.S83069
49. Zhang Z, Monro J, Venn BJ. Carbohydrate Knowledge and expectations of nutritional support among five ethnic groups living in New Zealand with pre- and type 2 diabetes: a qualitative study. *Nutrients*. 2018;10(9):1225. doi:10.3390/nu10091225
50. Wang Y, Zhang Y, Guo T, Han J, Fu G. Knowledge level and health information-seeking behavior of people with diabetes in rural areas: a multicenter cross-sectional study. *Front Public Health*. 2024;12:1285114. doi:10.3389/fpubh.2024.1285114
51. Taniguchi M, Hiyama Y, Kamitani T, et al. Comparison of recovery of mobility and self-efficacy after total knee arthroplasty based on two different protocols: a prospective cohort study. *Modern Rheumatol*. 2020;30(1):197–203. doi:10.1080/14397595.2018.1553228
52. Ong-Artborirak P, Seangpraw K, Boonyathee S, Auttama N, Winaiprasert P. Health literacy, self-efficacy, self-care behaviors, and glycemic control among older adults with type 2 diabetes mellitus: a cross-sectional study in Thai communities. *BMC Geriatrics*. 2023;23(1):297. doi:10.1186/s12877-023-04010-0
53. Ohta R, Sano C. Factors affecting the duration of initial medical care seeking among older rural patients diagnosed with rheumatoid arthritis: a retrospective cohort study. *BMC Rheumatol*. 2024;8(1):23. doi:10.1186/s41927-024-00392-9
54. Zou H, Liu J, Jiang D, Hou L, Wang W, Zhang L. The effect of health literacy on disease management self-efficacy in chronic disease patients: the mediating effects of social support and the moderating effects of illness perception. *Patient Prefer Adher*. 2024;18:657–666. doi:10.2147/PPA.S447320
55. Miller MJ, Cook PF, Magnusson DM, et al. Self-efficacy and social support are associated with disability for ambulatory prosthesis users after lower-limb amputation. *J Injury, Funct, and Rehab*. 2021;13(5):453–460. doi:10.1002/pmrj.12464
56. Luszczynska A, Pawlowska I, Cieslak R, Knoll N, Scholz U. Social support and quality of life among lung cancer patients: a systematic review. *Psycho-Oncol*. 2013;22(10):2160–2168. doi:10.1002/pon.3218
57. Ting X, Yong B, Yin L, Mi T. Patient perception and the barriers to practicing patient-centered communication: a survey and in-depth interview of Chinese patients and physicians. *Patient Educ Counsel*. 2016;99(3):364–369. doi:10.1016/j.pec.2015.07.019
58. Bailey A, Mallow J, Theeke L. Perceived self-efficacy, confidence, and skill among factors of adult patient participation in transitional care: a systematic review of quantitative studies. *SAGE Open Nurs*. 2022;8:23779608221074658. doi:10.1177/23779608221074658
59. Bandura A. The explanatory and predictive scope of self-efficacy theory. *J Soc Clin Psychol*. 1986;4(3):359–373. doi:10.1521/jscp.1986.4.3.359
60. Li Y, Zhang W, Ye M, Zhou L. Perceived participation and autonomy post-stroke and associated factors: an explorative cross-sectional study. *J Adv Nurs*. 2021;77(3):1293–1303. doi:10.1111/jan.14670
61. Tang H, Dong S, Wang S, et al. Perceived participation in decision-making on primary surgery and associated factors among early breast cancer patients: a cross-sectional study. *Cancer Nurs*. 2023;46(2):111–119. doi:10.1097/NCC.0000000000001071