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REVIEW

Intention to Engage in Exercise Rehabilitation Among Patients with Cardiovascular Disease: A Scoping Review

Yanyan Song, Lishu Peng, Lin Wu, Xue Liu, Yan Wang

School of Nursing, Hebei University, Baoding, Hebei, 071000, People' s Republic of China

Correspondence: Yan Wang, School of Nursing, Hebei University, No. 342 of Yuhua East Road, Lianchi District, Baoding City, Hebei Province, 071000, People's Republic of China, Tel +86 13833258628, Email chjanwy@163.com

Purpose: This paper compiles the scope of research on exercise rehabilitation intention among patients with cardiovascular diseases and identifies the current landscape, influencing factors, assessment instruments, and intervention strategies related to exercise rehabilitation intention, aiming to inform clinical efforts aimed at encouraging active patient engagement in rehabilitation.

Methods: Eleven Chinese and English databases were systematically searched between the database's creation and August 28, 2024, under the scoping review methodology. Two researchers independently performed literature screening and data extraction.

Results: A total of 25 studies were included (21 in English, 4 in Chinese), 16 specifically assessed exercise rehabilitation intentions in cardiovascular disease patients, approximately half (8/16) of the cardiovascular disease patients exhibited suboptimal exercise rehabilitation intention. The assessment tools for exercise rehabilitation intentions are diverse, with dimensions primarily focused on willingness and planning. Determinants included psychosocial, disease-related, and sociodemographic factors. Identified intervention strategies included group health education, individual psychological support, and motivational interviewing.

Conclusion: Among cardiovascular disease patients exercise rehabilitation intentions remain inconsistent, as approximately half of the studies indicating medium-to-low average levels, which are influenced by several factors. Therefore, to accurately assess patients' levels of exercise rehabilitation intention, further research may focus on enhancing the dimensions, reliability, and validity of assessment tools. Exploring multifaceted and varied intervention strategies could potentially improve patients' exercise rehabilitation intention and compliance.

Keywords: cardiovascular disease, behavioral intention, exercise rehabilitation intention, prevention, scope review

Introduction

Cardiovascular disease(CVD)has emerged as a major public health problem that threatens human life and health.[1] In China, CVD morbidity and mortality rates remain persistently high, and it is the primary cause of death for urban and rural residents.[2] Research demonstrates that exercise rehabilitation, a core component of cardiac rehabilitation (CR), significantly enhances exercise capacity, endurance in CVD patients, and effectively delays the progression of CVD, improving their long-term prognosis.[3–7] All CVD patients without contraindications to exercise rehabilitation should receive exercise-focused CR during the stabilization period.[8,9] However, the percentage of patients participating in and adhering to exercise rehabilitation is low, ranging from 19% to 34%.[10,11]

Exercise rehabilitation intention reflects an individual's subjective assessment of their willingness or likelihood to engage in future exercise rehabilitation and the degree of effort they plan to exert.[12] While physical activity intention emphasizes general willingness to exercise, it primarily targets health-oriented motivations for initiating or maintaining exercise, thereby constituting a different measurement form of the same concept. Moreover, existing literature often utilizes related concepts, such as behavioral change stages and exercise readiness, as surrogate indicators for exercise rehabilitation intention; these concepts are also integrated into the operational definition of this review. According to the

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Theory of Planned Behavior, behavioral intention reflects a subjective decision-making process before action and constitutes a fundamental component of numerous participation models. Studies confirm the level of exercise rehabilitation intention significantly affects the participation rate and adherence to exercise of patients, which is a key factor in exercise adherence.[13–15] This predictive relationship is particularly crucial amid the global shift toward home-based, community-based, and remote rehabilitation models, as the success of these decentralized models heavily depends on patient engagement and adherence. Given that exercise rehabilitation intention is a robust predictor of post-discharge rehabilitation participation, assessing and intervening in patients' intention before discharge is critical to optimizing their subsequent active engagement in exercise rehabilitation programs.

Despite the significant influence of exercise rehabilitation intention on participation in exercise rehabilitation behaviors and outcomes, current research on exercise rehabilitation intention among CVD patients is fragmented. Although exercise rehabilitation intention strongly predicts patients' future exercise rehabilitation behavior, current research on its influencing factors still insufficient, limiting the development of effective intervention measures. This is reflected in the limited number of interventional studies and the proliferation of assessment tools that generally lack multidimensionality and rigorous validation. These tools only assess whether patients are willing or intend to engage in exercise rehabilitation, failing to comprehensively reflect the level of their exercise rehabilitation intention. They also do not adequately address assessment needs within specific cultural contexts or resource-constrained settings. Furthermore, the lack of rigorous validation mechanisms further restricts the selection and application of these tools by clinical practitioners during evaluations. Existing intervention studies predominantly focus on specific aspects or dimensions of exercise rehabilitation intention, lacking in-depth interventions targeting individual patient beliefs. This limitation partially undermines the effectiveness and applicability of intervention measures.

A scoping review methodology enables a rapid description of research progress within a specific field, synthesizes existing knowledge, and identifies gaps in the literature. Therefore, this study employed a scoping review methodology[16] to map the existing literature on exercise rehabilitation intention among CVD patients, including assessment tools or methods, influencing factors, and intervention approaches. The overall objective is to guide research in the field of exercise intentions among cardiovascular patients by reviewing existing studies, identifying research gaps, and proposing a series of actionable research recommendations. Guided by the Participants-Concept-Context (PCC) framework,[17] the primary objectives of this review are to explore the following issues: 1) What levels of exercise rehabilitation intention exist among CVD patients? 2) Which assessment tools or methods currently measure exercise rehabilitation intention in this population? 3) What factors influence exercise rehabilitation intention in CVD patients? 4) What intervention studies have targeted exercise rehabilitation intention in this population?

Materials and Methods

This study is based on the scoping review framework by Arksey and O'Malley, which includes the following sequential steps: defining the research question, identifying relevant studies, selecting studies, extracting data graphs, organizing summaries, and reporting results.[16] The study also adheres to the scoping review reporting checklist (PRISMA extension for scoping reviews, PRISMA-ScR).[18] Although a protocol was developed by the study authors, this was not published. Given the heterogeneous methods used in available studies from qualitative interviews to quantitative surveys, and lack of a harmonized approach in the field, no formal quality assessment was conducted, which is consistent with the purpose of a scoping review, but caution is needed when interpreting results.

Operational Definitions

We defined exercise rehabilitation intention as an individual's subjective assessment of their willingness or likelihood to engage in future exercise rehabilitation and the degree of effort they plan to exert. Physical activity intention represents a different measurement form of the same concept. Moreover, behavioral change stages and exercise readiness are frequently used as surrogate indicators for exercise rehabilitation intention.

Identifying Relevant Studies

To ensure comprehensive coverage of relevant literature, systematic searches were conducted across 11 databases from their inception to August 28, 2024. These included international platforms (PubMed, Web of Science, Cochrane Library, Embase, EBSCO, Scopus, OpenGrey) to capture global research, and Chinese databases (China National Knowledge Infrastructure, Chinese Biomedical Literature Service System, Wanfang, VIP) to incorporate region-specific studies.The search strategy integrated controlled vocabulary (Medical Subject Headings, Emtree terms) with free-text keywords, co-designed by a professor with long-standing expertise in cardiac rehabilitation research and clinical practice to align with field-specific terminology. A representative string example: (cardiovascular diseases OR cardiac diseases OR coronary heart disease OR circulatory system diseases) AND (exercise rehabilitation willingness OR exercise rehabilitation intention OR exercise willingness OR exercise intention OR cardiac rehabilitation willingness). Full platform-specific strategies are detailed in Appendix 1.

Study Selection

Inclusion criteria: (1) The study population was patients with CVD; (2) Age≥18 years; (3) the literature included studies related to exercise rehabilitation intention, including those on general physical activity intention; (4) The study context focused on the level of exercise rehabilitation intention, assessment tools/methods, influencing factors, and intervention trials; (5) Inpatient, post-discharge, and community populations; (6) The language was either Chinese or English; (7) The study was an original investigation. Exclusion criteria: (1) Studies involving patients with concurrent major non-cardiovascular diseases, such as malignant tumors and severe mental illness; (2) Conference abstracts and letters to the editor; (3) literature that has been repeatedly published or for which the full text is unavailable.

Study Screening and Data Extraction and Analysis

After importing the retrieved literature into Note Express software for duplicate removal, two researchers trained in evidence-based nursing independently screened the titles and abstracts according to the inclusion and exclusion criteria. They then conducted a secondary screening by reading the full text of the eligible literature. In case of any dispute, the full text was reviewed and discussed with a third researcher who also had experience with evidence-based nursing course training to determine the final included literature.

Data extraction was independently performed by two researchers using pre-designed Microsoft Excel spreadsheet. To ensure reliability of the process, Cohen's kappa coefficient for inter-rater agreement was computed after dual independent extraction of five records, resulting in $\kappa = 0.88$, where a Kappa of greater than 0.8 is considered to represent a high level of agreement between the researchers. Discrepancies were resolved via researcher deliberation; unresolved issues were adjudicated by a third independent researcher. After consensus was reached, the extraction template was finalised and included: first author, publication year, country, study type, research subjects, sample size, level of exercise rehabilitation intention, assessment tools/methods, influencing factors, results, intervention measures (including intervention content, control measures, and effect evaluation), and other relevant findings. The extraction results were compared. If discrepancies arose, both researchers re-examined the literature and discussed the issues to reach a consensus. If the issue remained unresolved, a third researcher was consulted. Further details are presented in Figure 1.

Collate, Summarize and Report Results

Focusing on organizing key elements including exercise intention levels, assessment tools/modalities, influencing factors, and intervention studies among cardiovascular disease patients, we employed a qualitative content analysis approach (Levac, Colquhoun, and O'Brien, 2010). The analytical findings are as follows: (1) Most patients exhibited moderate to low levels of exercise rehabilitation intention; (2) A total of 15 assessment tools or modalities were identified, varying in quality; (3) Influencing factors were categorized into socio-demographic, disease-related, and psycho-social factors; (4) Intervention methods included motivational interviewing, brief psychological interventions, and group health education.

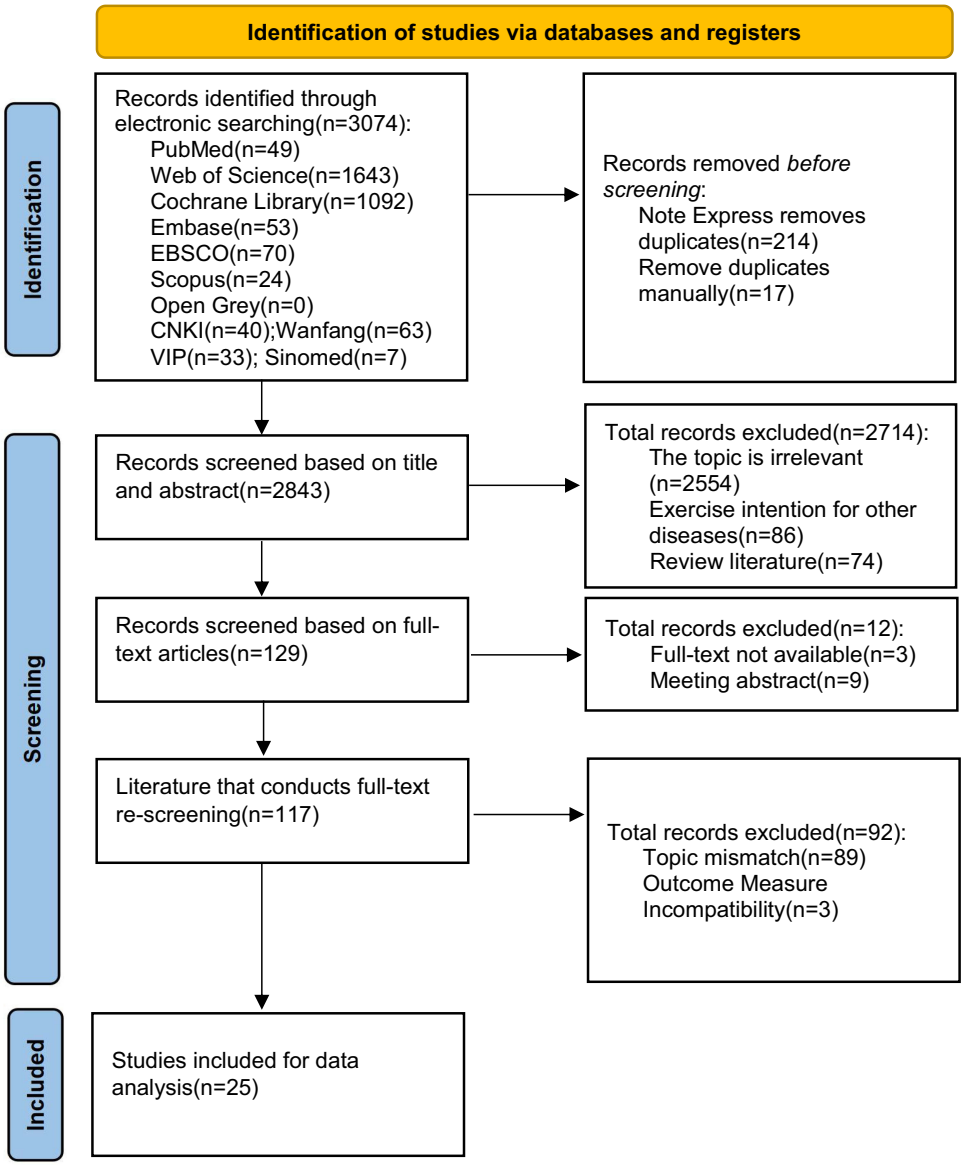

Figure 1 Flowchart of the study retrieval process.

Ethical Consideration

Since this study used secondary data from the literature, there were no ethical issues.

Results

Descriptive Statistics Summary

A total of 3074 documents were retrieved and 25 were finally included after de-weighting and screening, with a total sample size of 13,210 cases.

Basic Information of the Included Literature

The 25 included articles comprised 21 in English[13–15,19–36] and 4 articles in Chinese.[37–40] The publication period spanned from 1991 to 2024. These studies included 11[15,19,24,25,27,29,35–37,39,40] cross-sectional studies, 5[20,21,23,26,30] qualitative studies, 5[13,22,32–34] prospective studies, 2[14,38] parallel randomized controlled trials, and 2[28,31] experimental studies. In terms of regions, 7 studies[13,23,30,37–40] were from China, 6 studies were from Canada,[14,31–34,36] 3 studies were from the

United States,[15,22,25] 2 studies were from Sweden,[21,26] Germany,[19] France,[20] Jordan,[24] European multicenter countries,[27] Austria,[28] Thailand,[29] and Australia.[35] 1 article each. The basic characteristics of the included studies are shown in Table 1.

Research on the Intention Level and Assessment Tools of Exercise Rehabilitation in Patients with CVD

A total of 16 out of 25 included studies reported levels of CVD patients' exercise rehabilitation intention.[13–15,19,22–24,27,28,32–34,36,37,39,40] Of these 16 studies, 10 reported intention levels as mean and standard deviation values, while 2 adopted a level grading system (High/Medium/Low), and 4 reported the proportion of participants expressing intent to

Table 1 Basic Characteristics of Included Studies (n=25)

Author (Year)	Population	N	Theory	Core Concepts
Wang et al (2023)[13]	Coronary heart disease	282	Theory of planned behavior, Theory of time self-regulation	Intention
Rouleau et al (2018)[14]	Acute coronary syndrome	96	—	Intention
Blanchard et al (2003)[15]	All patients entering the rehabilitation program	215	Theory of planned behavior	Intention
Ntovoli et al (2024)[19]	Cardiovascular disease	50	Tri-component attitude theory	Intention
Serves et al (2023)[20]	Acute myocardial infarction	17	—	Intention
Nilsson et al (2023)[21]	Myocardial infarction	15	—	Intention
Bierbauer et al (2023)[22]	Cardiac patients	137	Health Action Process Approach	Intention
Feng et al (2022)[23]	Aortic dissection	24	Health Action Process Approach	Intention
Kan'an (2020)[24]	Coronary heart disease	109	Theory of planned behavior	Intention
Riley et al (2018)[25]	Acute cardiac condition	105	—	Intention
Bäck et al (2017)[26]	Coronary artery disease	16	—	Intention
Prugger et al (2016)[27]	Coronary heart disease	8966	Transtheoretical model	Stage of Change
Platter et al (2016)[28]	Coronary artery disease	193	Health Action Process Approach	Intention
Kheawwan et al (2016)[29]	Postcardiac surgery	533	Transtheoretical model	Readiness
Wong et al (2015)[30]	Coronary heart disease	22	—	Intention
Ghisi et al (2015)[31]	Coronary artery disease	306	Health Action Process Approach	Intention
Tulloch et al (2009)[32]	Coronary heart disease	787	Protection motivation theory	Intention
Blanchard et al (2009)[33]	Coronary heart disease, post–acute event patients	76	Protection motivation theory	Intention
Tulloc (2007)[34]	Coronary heart disease	214	Social cognitive theory	Intention
Plotnikoff et al (1998)[35]	Cardiac sufferers	151	Protection motivation theory	Intention
Godin et al (1991)[36]	Myocardial infarction	161	Theory of planned behavior	Intention
Zhu et al (2023)[37]	Middle-aged and elderly patients with coronary heart disease following percutaneous coronary intervention	198	Social cognitive theory	Intention

(*Continued*)

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Table 1 (Continued).

Author (Year)	Population	N	Theory	Core Concepts
Wen et al (2022)[38]	Cardiac surgery inpatient unit	130	—	Intention
Wang et al (2021)[39]	Percutaneous coronary intervention	165	Health Action Process Approach	Intention
Gao et al (2021)[40]	Percutaneous coronary intervention	242	Theory of planned behavior	Intention

engage in active exercise rehabilitation. Within this subset of 16 studies, 8[13–15,32–34,36,40] reported high exercise rehabilitation intention levels and a relatively high proportion of patients with positive exercise rehabilitation intention, while the remaining 8[19,22–24,27,28,37,39] reported moderate-to-low intention levels.

Patients with high exercise rehabilitation intention scores were predominantly those diagnosed with acute coronary syndrome (ACS) and post-acute coronary artery disease (CAD) events, whereas low scores were observed primarily in patients with stable coronary artery disease, aortic dissection, and middle-aged and elderly patients who had undergone percutaneous coronary intervention (PCI). Postoperative recovery periods may induce physical discomfort and psychological distress, which hinders patients' adoption of positive behavioral changes. In addition, middle-aged and elderly patients often experience heightened physiological limitations and comorbidities related to aging, which compromises their exercise rehabilitation intention. Furthermore, across the 16 included studies, a total of 15 assessment tools or methods were identified. These tools primarily focused on the dimensions of intention and planning but exhibited substantial variability: most were non-standardized, and different scales varied in their sensitivity to measuring patients' intentions, resulting in inconsistencies in result interpretation. Only two evaluation tools were developed by Chinese scholars, with specific details presented in Table 2.

Research on the Influencing Factors of Exercise Rehabilitation Intention in Patients with CVD

Among the 25 included studies, 20 investigated factors influencing exercise rehabilitation intentions in CVD patients, including 15 quantitative studies and five qualitative studies. The theoretical frameworks, core concepts, and specific influencing factors underlying each study were systematically organized and summarized in Table 3.

Five studies,[13,15,24,36,40] grounded in the Theory of Planned Behavior (TPB),[41] collectively illustrate that behavioral intention is jointly driven by behavioral attitude, which reflects individuals' positive or negative evaluations of exercise rehabilitation; subjective norm, which encompasses perceived social pressure, such as support and expectations from family and healthcare teams; and perceived behavioral control, which includes individuals' perceived ability to perform exercise rehabilitation and perceived barriers, such as time, energy, and physical condition.[15,24,36,40] Additionally, one study[13] integrated the TPB with the Theory of Time Self-Regulation,[42] thereby highlighting the role of long-term consequence perception in decision-making trade-offs. Two studies,[22,39] grounded in Health Action Process Approach (HAPA) theory,[43] provided evidence from a dynamic stage perspective,[22] validating the foundational role of core motivational stage variables, such as risk perception, outcome expectancy, and behavioral self-efficacy, in intention formation and examining the influence of multiple contextual factors on exercise rehabilitation intention.[39] Furthermore, three studies,[32,33,35] grounded in protective motivation theory (PMT),[44] conducted in-depth analyses of the mechanisms underlying threat and response assessments. Consistent findings indicate that in response evaluation, self-efficacy and response efficacy are the strongest predictors of intention.[32] Conversely, in threat evaluation, perceptions of disease severity and the resulting fear do not directly drive action but may exert complex influences on the long-term maintenance of intention.[33,35] Other studies grounded in Social Cognitive Theory (SCT),[34,45] tri-component (ABC) theory of attitudes,[19,46] and Trans theoretical Model (TTM)[27,47] have likewise demonstrated the significant influence of self-efficacy, outcome expectancy, affective attitudes such as perceived safety, and psychological states such as depression on exercise rehabilitation intentions. Two studies[25,37] identified influencing factors such as literacy, participation in Phase I cardiac exercise

Table 2 An Assessment Tool for Exercise Rehabilitation Intentions (n=15)

Category	Name	Scoring Method/Criteria	Psychometric Properties	Content Assessed
Single Item	Physical Activity Intention[22]	—	—	"I intend to engage in physical activity tomorrow."
	Behavioral Intention[36]	Probability scale (1%-100%), higher percentage indicates greater likelihood	—	"What is the probability that you will participate regularly in one or more physical activities during your leisure time in the next year?"
2-Item Tools	ABC Attitude Theory Questionnaire - Online Exercise Intention Subscale[19]	Likert 5-point scale (1~5), higher total score indicates stronger intention	—	1. I want to participate in online exercise. 2. I intend to participate in online exercise.
	Willingness Questionnaire for CHD Patients to Participate in Phase II Cardiac Exercise Rehabilitation[37]	—	—	1. Are you willing to participate in Phase II cardiac exercise rehabilitation? 2. Reasons for unwillingness (multiple choice).
	Home-Based EBCR Intention Questionnaire[28]	Likert 7-point scale (1~7), higher total score indicates stronger intention	Cronbach's α= 0.804	1. I intend to participate in scheduled exercise sessions during CR. 2. My goal during CR is to participate in: [some/all] scheduled exercise sessions.
	TPB Questionnaire - Intention Subscale[24]	Likert 7-point scale (item: 1~7; total: 2~14), higher score indicates stronger intention	Cronbach's α= 0.72	1. How often do you intend to participate in regular physical activity? 2. I want to exercise regularly.
	HAPA Model Intention Subscale[31]	Likert 7-point scale (1~7), higher total score indicates stronger intention	—	1. I will try to perform the target behavior. 2. I intend to perform the target behavior.
	Home EBCR Intentions[33]	Likert 5-point scale, Individual entries and total scores range from 1 to 5 points, higher total score indicates stronger intention	Cronbach's α= 0.94	1. During the next 3 months of in-home CR, I am definitely working out once a week 2. During the next 3 months of in-home CR, I plan to exercise once a week
3-Item Tools	Chinese TPB Version - Intention Subscale[13]	Likert 6-point scale (1~6), higher total score indicates stronger intention	Cronbach's α= 0.944	1. I intend to engage in recommended levels of PA next week. 2. I will try to engage in recommended levels of PA next week. 3. I will strive to engage in recommended levels of PA.
	PCI Postoperative Patients' Exercise Rehabilitation Participation Intention Questionnaire - Behavioral Intentio[40]	Likert 5-point scale (item: 1~5; total: 3~15), higher score indicates stronger intention	Cronbach's α= 0.809	1. Under current conditions, I intend to participate in exercise rehabilitation. 2. Within one month after discharge, I plan to participate in exercise rehabilitation. 3. Within six months after discharge, I plan to participate in exercise rehabilitation.
	Short and long term campaign intentions[32,34]	Likert 7-point scale (item: 1~7; total: 3~15), higher score indicates stronger intention	Cronbach's α= 0.91	1. I intend to exercise regularly in the next month. 2. I intend to exercise regularly in the next 6 months. 3. Number of times I will perform ≥30 min of moderate-intensity exercise per week in the next 6 months.

(*Continued*)

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Table 2 (Continued).

Category	Name	Scoring Method/Criteria	Psychometric Properties	Content Assessed
4-Item Tool	Short-Term & Long-Term Exercise Intention[39]	Likert 5-point scale (item: 1~5; total: 4~20), higher score indicates stronger intention	Cronbach's α= 0.814	1. I intend to actively participate in the exercise. 2. I intend to exercise during leisure time ≥3 times/week, ≥30 min/session. 3. I intend to exercise occasionally. 4. I intend to engage in activities to enhance fitness and muscle strength during my leisure time.
6-Item Tool	Stages of Change questionnaire(SOC)[27]	Categorized based on response options	——	"Do you exercise regularly?" Options: Yes (>6 months); Yes (<6 months); No, but plan to start within 30 days; No, but plan to start within 6 months; No, do not plan to start within 6 months; Unsure.
8-Item Tool	Patient-Centered Assessment and Counseling for Exercise, (PACE)[23]	Stage assignment based on options (8 behavioral stages)	——	Items 1–8: Descriptions ranging from "No current regular vigorous/moderate exercise & no plan to start in next 6 months" to "Sustained vigorous (>3x/week) or moderate (>5x/week) exercise for >6 months".
13-Item Tool	Readiness to Change Exercise Questionnaire (RTC-EQ)[29]	Likert 5-point scale (item: 1~5), higher dimension score indicates greater readiness	Cronbach's α: Pre-intention =0.68;Contemplat-ion=0.75; Preparation=0.72; Action=0.75	Assessing exercise readiness in Thai cardiac surgery patients. Four Dimensions: 1. Pre-intention (2 items): Unaware/denial of the problem. 2. Contemplation (4 items): Aware of the problem but not committed to change. 3. Preparation (5 items): Plan to act within 30 days. 4. Action (2 items): Sustained change >6 months.

Notes: - is not available or not involved.

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Table 3 Factors Influencing Exercise Rehabilitation Intentions Among Patients with CVD (n=20)

Theory	Key Concepts		Influencing Factors	
Quantitative research				
Theory of Planned Behavior	Attitude		Attitude toward exercise rehabilitation	
	Subjective norm		Group support	
	Perceived behavioral control		Perceptual impairments, including time management difficulties, psychological adaptation difficulties, laziness, perceived severity, and perceived vulnerability	
	Background information		Monthly per capita household income, Place of residence, Time spent traveling from home to hospital, Smoking status	
HAPA Theory	Motivational phase: Action self-efficacy, outcome expectations, risk perceptions		Risk perception, outcome expectancy, self-efficacy for action, social support	
	Volition phase: Maintaining self-efficacy, action planning, coping planning		—	
	Background information		Age, moderate-intensity physical activity over the past week, and heart function classification	
Protection Motivation Theory	Threat appraisals		Perceived severity, fear of heart disease with impacts persisting for six months	
	Coping appraisals		Self-efficacy and response efficacy were the sole predictors of exercise rehabilitation intentions at both the 3-month and 6-month time points.	
Social Cognitive Theory	Personal cognitive factors	Self-efficacy	Self-efficacy	Past exercise experience, social support, and supportive physical environments also indirectly influence patients' exercise rehabilitation intentions via self-efficacy and outcome expectations.
		Outcome expectations	Outcome expectations	
		Goal setting	—	
	Environmental factors	Social environment, physical environment	—	
	Behavioral factors	Past behavior and experience	—	
Tri-component attitude theory	Affective		Safety awareness	
	Behavioral		—	
	Cognitive		—	
	Background information		Age, gender	
Transtheoretical model	Precontemplation		Depressive symptoms	
	Contemplation		—	
	Preparation		—	
	Action		—	
	Maintenance		—	
	Termination		—	

(*Continued*)

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Table 3 (Continued).

Theory	Key Concepts	Influencing Factors
—	—	Educational attainment, participation in Phase I rehabilitation during hospitalization, social support, and smoking/relapse behavior.
Qualitative research		
—	—	Previous exercise experience, acute-phase needs, attitudes toward exercise rehabilitation, and interactions with the physical therapist.
—	—	Peer support, team dynamics, social support, and the Chinese cultural context.
—	—	Disease severity (acute events), personal exercise level, illness beliefs, recovery expectations, external barriers (eg, time, weather), physical barriers (eg, fatigue, pain), social motivation, and exercise habits.
HAPA Theory	Motivational phase: Action self-efficacy, outcome expectations, risk perceptions	Risk perceptions, outcome expectations, action self-efficacy,
	Volition phase: Maintaining self-efficacy, action planning, coping planning	—
—	—	Patients' personal beliefs and expectations, fear of exercise, previous exercise habits, and computer experience (for remote rehabilitation)

Notes: - is not available or not involved.

rehabilitation during hospitalization, social support, smoking, and resumption or continuation of smoking after discharge using questionnaires and regression analysis with different variables.

Five qualitative studies further enriched the understanding of influencing factors. Findings revealed that factors such as the quality of interactions with healthcare professionals,[26] culturally specific social dynamics,[30] personalized beliefs and emotions about illness, such as fear,[20] and specific physical and situational barriers,[23] such as fatigue, weather, and computer experience, may be simplified in quantitative models but hold significant weight in patients' decision-making experiences. One study,[21] conducted through interviews within the HAPA theoretical framework, yielded results consistent with quantitative research and highlighted the central role of risk perception, outcome expectancy, and self-efficacy.

In synthesizing the current evidence, research on factors influencing exercise rehabilitation intentions among CVD patients centers on three primary domains: sociodemographic characteristics, disease-related variables, and psychosocial determinants.

Interventional Study on Exercise Rehabilitation Intention in CVD Patients

Among the 25 studies, four focused on intervention research regarding exercise rehabilitation intentions in cardiovascular disease patients. The theoretical frameworks, intervention measures, duration/frequency of interventions, and outcome measures of each study were systematically reviewed and summarized in Table 4.

Existing intervention pathways predominantly rely on two major theoretical frameworks. The first pathway involves interpersonal psychological strategies, exemplified by Motivational Interviewing (MI),[14,38] which resolves patients' internal psychological conflicts through empathetic dialogue to enhance intrinsic motivation, targeting the intention formation stage. The second pathway comprises structured education programs based on HAPA theory,[28,31] guiding patients in developing concrete action plans and coping strategies to elevate intention and translate it into actionable behavioral plans, targeting the execution stage. Collectively, these two pathways address critical weak links in the behavioral change chain. In terms of intervention content, measures generally extend beyond single-faceted health education to integrate information provision, skills training, and psychological support. Intervention contact points, duration, and frequency varied widely, ranging from single 30- to 60-minute motivational interviews,[14] one-time group

Table 4 Basic Characteristics of Intervention Studies on Exercise Rehabilitation Intentions Among Patients with CVD (n=4)

Author	Research Design	Intervention Theory/ Methods	Intervention Measures	Intervention Duration/ Frequency	Key Performance Indicators
Wen et al[38]	Randomized controlled	Motivational Interviewing	Health lecture, face-to-face motivational interviewing, and discharge instructions	30–60 minutes per session	Home-based cardiac exercise rehabilitation intentions, perceived illness, exercise self-efficacy, and exercise transition stages
Rouleauet al[14]	Randomized controlled	Motivational Interviewing	Establish rapport, clarify and establish importance, build confidence, collaborate to solve problems, and summarize the meeting	Administered once after referral and before enrollment, the session lasts 30–60 minutes.	Exercise rehabilitation Intention, beliefs about cardiac exercise rehabilitation, perceived barriers, self-efficacy, disease perception, social support, acceptability of the intervention, and participation in cardiac exercise rehabilitation
Platter et al[28]	Longitudinal Controlled Study	HAPA Theory	Information education, developing personal action and response plans, and group discussion of plans	One group meeting lasting one hour	Baseline assessment for the study included general self-efficacy, intention, action plan, coping plan, and action control. Follow-up data were collected at 2 and 6 months post-discharge and encompassed physical activity levels, satisfaction with physical activity, and the impact of physical activity on health.
Ghisi et al[31]	Quasi-experimental Study	HAPA Theory	Multidisciplinary Program (24 group sessions, workbook, and individual plan) Program content includes educational content, learning activities, learning assessments, behavior-based action plans, and evaluation of patients' motivation and confidence to incorporate changes into their lifestyle	Once a week for 24 weeks	Patient knowledge, HAPA questionnaire, and physical activity behavior

education sessions, to 24-week structured courses,[31] reflecting different studies' explorations of intervention dosage. In summary, the intervention studies included in this review demonstrate the feasibility of enhancing patients' exercise rehabilitation intentions through structured psychological interventions and educational programs, providing a foundational reference for subsequent research and practice.

Discussion

Research on Exercise Rehabilitation Intention in CVD Patients Warrants Significant Strengthening

Exercise rehabilitation intention serves as a primary determinant of active engagement and sustained adherence to post-discharge rehabilitation protocols among CVD patients. However, research in this area is hampered by theoretical and methodological inconsistencies. Although many studies cite frameworks like the TPB or the HAPA, some studies integrate concepts such as behavioral stages from TTM without clearly distinguishing constructs. These issues may contribute to inconsistent conclusions regarding the same influencing factors. The absence of standardized and normative assessment

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tools restricts the ability of existing methods to effectively assess patients' exercise rehabilitation intentions at discharge. Moreover, these methods fail to comprehensively capture the intrinsic causes influencing such intentions, thereby limiting healthcare professionals' capacity to implement targeted interventions tailored to individual patient differences. Studies examining influencing factors often lack comprehensiveness and systematization, and inadequately address multidimensional influences, such as cultural background, economic status, and personal preferences. As a result, they do not fully address the influences on patients' exercise rehabilitation intentions, and the findings regarding some factors are inconsistent. Additionally, frailty, cognitive function, and depressive symptoms are common in the elderly population and are important factors affecting intention and behavior, yet current research often overlooks them, making them worthy of future focus.[48] Existing research on intention has generally paid less attention to the stages of behavioral change and the maintenance of long-term behavior. Future research may benefit from exploring the dynamics of intention and the mechanisms underlying its long-term maintenance.[49] Dietary adjustments can indirectly influence exercise rehabilitation intentions through various pathways. Future research could potentially explore the synergistic effects between dietary modifications and exercise rehabilitation intentions on rehabilitation outcomes.[50,51] The number of intervention studies is relatively limited, and existing programs typically address only a single dimension, with significant variations in the approach and content of the intervention and evaluation indicators. Current evidence suggests that future research could consider delving deeper into these areas to enhance the comprehensiveness and scientific validity of the studies.

Validated Instruments for Assessing Exercise Rehabilitation Intention in CVD Patients Await Development

Exercise rehabilitation intention is a multidimensional concept that falls under behavioral intention. According to the theory of planned behavior, it refers to an individual's willingness to perform a specific behavior, their planning, and the degree of effort they invest in achieving it. This intention is influenced by attitudes, subjective norms, and perceived behavioral control. Among the 15 assessment tools included in this study, PACE questionnaires have been applied across different countries and populations, demonstrating high reliability and validity. Home EBCR Intentions also demonstrate high reliability. These tools offer standardized and reliable measurement methods for assessing patients' exercise rehabilitation intention. However, despite these contributions, there are still limitations in the current assessment tools. Willingness and planning were the most frequently assessed dimensions. The tools that reflect this content in the two entries are suitable for rapid clinical screening. Some tools evaluated only patients' willingness or intention to engage in exercise rehabilitation.[19,22,31,33,36,39,40] Others focused on self-efficacy or perceived barriers.[13,14,24,34,38] In contrast, attitudes, subjective norms, and other aspects have received limited attention, being included in only a few instruments or assessed by separate scales. Additionally, some instruments reflected the stages of patients' exercise rehabilitation,[23,27,29] but none comprehensively captured all dimensions of exercise rehabilitation intention. Moreover, most existing exercise rehabilitation intention assessment tools focusing solely on the patient perspective, which is inherently subjective and uncertain. This limits the assessment of patients' exercise rehabilitation intention at discharge and precludes effective determination of the intrinsic factors influencing patients' intentions. Consequently, it is challenging to guide healthcare professionals in implementing targeted interventions. This is a limitation in assessing patients' exercise rehabilitation intention at discharge. Accurate assessment of patients' pre-discharge intention to participate in exercise rehabilitation is critical for effectively guiding patients to actively participate in exercise rehabilitation after discharge and ensuring their adherence to future rehabilitation programs. Given the current limitations, future research may explore a more scientifically rigorous assessment tool that integrates theories and comprehensively covers the multidimensional aspects of exercise rehabilitation intention. This includes patients' willingness to participate, plans, effort, practical barriers, attitudes, and social support. This will enhance the accuracy of assessing patients' intention to participate in exercise rehabilitation and provide healthcare professionals with a basis for targeted interventions, thereby improving patients' participation and adherence to exercise rehabilitation.

The Need for Further Enrichment in Intervention Studies on Exercise Rehabilitation Intention Among CVD Patients

Among the 25 included studies, four interventional studies each utilized the strategies of motivational interviewing, psychosocial health interventions, and educational interventions. Two of the motivational interviews, one study enhanced patients' awareness and self-efficacy for exercise rehabilitation through rapport-building, emphasis on home-based rehabilitation importance, and barrier resolution, resulting in some improvement in both willingness for home-based exercise and exercise self-efficacy. Another study[14] enhanced participation willingness through trust-building, importance clarification, confidence development, and collaborative problem-solving, indirectly improving rehabilitation adherence. Platter et al[28] conducted a study using a brief health psychology intervention in the form of a group education session to encourage patients to develop individual physical activity actions and coping plans, which were discussed within the group. In the short term, this study reported positive effects on the patients' exercise rehabilitation intention and physical activity levels. A comparative educational study[31] developed a new educational program based on the HAPA establishment, but it did not significantly differ from traditional education as expected. However, its role in promoting action planning must not be overlooked. Action planning within the HAPA model acts as a crucial link between intention and behavior, enabling patients to translate their intentions into concrete actions. Additionally, constructs like task self-efficacy and outcome expectancy may bolster patients' exercise intentions and planning, thus increasing the likelihood of behavioral change. Thus, despite current research not showing significant benefits of HAPA-based programs, their potential to facilitate behavioral change merits further investigation in future studies. Given the limited quantity of evidence and high heterogeneity among these studies, currently, it can only preliminarily suggest that motivational interviewing, group psychological interventions, and educational interventions have potential in improving intention, but this still needs to be confirmed by more high-quality randomized controlled trials.

In addition, these interventions primarily focused on isolated dimensions of exercise rehabilitation intention. While the first two studies addressed attitudes and subjective norms, the latter two emphasized perceived behavioral control. Exercise rehabilitation intention is inherently multidimensional rather than unidimensional. Although individualized interventions accommodate varying rehabilitation needs, they often neglect multidimensional intention differences. In line with patient needs and the principle of patient-centered care, single-dimensional programs struggle to address patients' complex demands and support individualized decision-making. For instance, individuals with low self-efficacy stemming from past sports injuries may struggle to adhere to such programs due to psychological barriers even when their intention to engage is strong, highlighting a clear disconnect between interventions and real-world clinical contexts. In terms of evidentiary support, a study by Ghisi et al[31] suggested that multidimensional integrated interventions may enhance patient adherence, with outcomes that appear to be more favorable than those of single-dimensional approaches. Current evidence indicates the potential constraints that current limitations impose on rehabilitation effectiveness. Therefore, future research could consider transcend the single-dimensional framework. Notably, the TPB provides a comprehensive framework for exercise rehabilitation intention interventions. Beyond attitudes and perceived behavioral control, factors like social support significantly influence behavioral intention. Therefore, healthcare professionals should target broader dimensions, including enhancing social support and reducing barriers, during intervention design. Practical approaches encompass developing social support networks, establishing peer groups, and implementing educational communications. Internet technology[52] further enables deeper integration of social resources,[53] facilitating multidimensional,[54] diversified, and structured[55] patient education. Importantly, enhancing CR participation depends not only on individual intentions but also on systemic factors like standardized programs, insurance coverage, and accessibility. Policy and institutional improvements are essential to address these broader challenges. Collectively, these integrated approaches may comprehensively enhance exercise rehabilitation intention, thereby improving participation and adherence.

Limitations

This scoping review adhered to Arksey and O'Malley's methodological framework while acknowledging several constraints. Primarily, the linguistic scope remained restricted exclusively to Chinese and English publications,

potentially introducing cultural and geographic bias. Furthermore, supplementary citation tracking was omitted from the screening protocol, creating possible gaps in source identification. The exclusion criteria systematically eliminated non-traditional publication formats including but not limited to conference abstracts, letters, and commentaries, which may contain emergent findings. Additionally, gray literature interrogation was limited to partial database coverage rather than comprehensive retrieval, potentially overlooking unpublished datasets and institutional reports. Notably, no pre-registration of the review protocol was conducted, which may increase the risk of selective reporting bias. Finally, consistent with scoping review methodology, no critical appraisal of included studies was performed, precluding assessment of evidence strength and necessitating cautious interpretation of findings.

Conclusions

This study synthesizes relevant research on exercise rehabilitation intention in the cardiovascular field, highlighting key areas for future research and clinical action. Our review uniquely consolidates findings on intention levels, influencing factors, assessment tools, and intervention methodologies, underscoring the importance of intention-based guidance. Future research may benefit from further exploring the multidimensional influencing factors of exercise rehabilitation intention. Additionally, efforts should focus on selecting, developing, or revising assessment tools to achieve a more scientific and comprehensive evaluation of exercise rehabilitation intention in CVD patients. In clinical practice, strengthening inter-professional teamwork and multidimensional joint interventions could improve patients' levels of exercise rehabilitation intention, enhance their participation in exercise rehabilitation, and ultimately promote better health outcomes. Concurrently, the standardized intervention model and management plan can be constructed based on the theoretical framework of planned behavior, taking into account the current situation of CR and the individual needs of CVD patients. This approach not only enhances exercise adherence but also promotes overall health, making it a valuable contribution to the field of cardiovascular rehabilitation.

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