Journal of Multidisciplinary Healthcare

Dovepress
Taylor & Francis Group

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REVIEW

Contextual Barriers and Facilitators to Exercise-Based Cardiac Rehabilitation in China: A CFIR 2.0-Guided Systematic Review of Policy, Cultural, and Organizational Determinants

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Purpose: Exercise-based cardiac rehabilitation (CR) is internationally recognized as an essential component of secondary prevention for coronary heart disease (CHD). However, participation in China remains low. Although barriers to CR have been extensively reported worldwide, China's regional disparities and distinct exercise traditions create context-specific constraints and opportunities. This study conducted a systematic review using the updated Consolidated Framework for Implementation Research (CFIR) 2.0 to identify multi-level factors that facilitate or impede CR implementation within Chinese healthcare systems.

Methods: Seven major databases were searched through October 2024 for studies examining determinants of participation in, or delivery of, exercise-based CR among CHD patients or clinical staff. Study quality was evaluated using the Mixed Methods Appraisal Tool, and extracted findings were organized according to the five CFIR 2.0 domains.

Results: Twenty studies met the inclusion criteria, and several influences distinctive to the Chinese context were identified. For example, hospitals in better-resourced provinces provided more complete and structured CR services, whereas those in less developed regions faced fragmented referral pathways and severely limited rehabilitation infrastructure. Cultural expectations further shaped engagement, with many patients favoring medication-based management over exercise, despite traditional practices such as Tai Chi and Baduanjin being viewed positively and offering a culturally acceptable entry point for rehabilitation. Digital tools, including mobile-health platforms and wearable devices, increasingly supported participation, particularly where in-person services were difficult to access. At the institutional level, CR implementation was more successful in centers with established multidisciplinary teams and stable funding, while hospitals lacking such support struggled to maintain consistent programs.

Conclusion: By clarifying how structural, institutional, and patient-level barriers interact to restrict cardiac rehabilitation in China, the review emphasizes that nationwide advancement will require policy reinforcement, better-trained rehabilitation teams, and implementation approaches tailored to patient needs.

Keywords: coronary heart disease, exercise rehabilitation, facilitators, barriers, consolidated framework for implementation research, mixed methods research

Introduction

Coronary heart disease (CHD) remains a major source of morbidity and mortality in China, where cardiovascular disease continues to rise and contributes substantially to the national health burden.[1] Exercise-based cardiac rehabilitation (CR) has been shown to improve functional recovery, reduce recurrent events, and enhance long-term prognosis,[2–4] and is considered a class I recommendation by major international societies.[5–8] Despite this strong evidence base, the global availability of CR remains limited, with marked disparities across income settings.[9] A similar pattern is seen in China, where recognition of cardiac rehabilitation has increased, yet implementation remains constrained and patient

Received: 4 September 2025
Accepted: 5 December 2025
Published: 17 December 2025

participation continues to be low. For instance, a survey of 454 large hospitals reported that only 24% offered structured exercise-based CR services.[10]

Although barriers to CR have been documented in many countries, most studies have centered on broad, frequently cited challenges such as low awareness, limited staffing, or competing clinical responsibilities, while far fewer have examined how local conditions shape implementation. In China, factors including substantial regional disparities in healthcare resources, the lack of routine insurance coverage for CR, and widespread familiarity with traditional exercise practices such as Tai Chi create a distinct context that affects both access and engagement. These context-specific influences have become increasingly relevant as China expands chronic disease management programs, promotes digital health solutions, and develops community-based rehabilitation pathways, all of which differ from models described in most international literature.[11]

Several theoretical frameworks have been developed to guide implementation research, and the Consolidated Framework for Implementation Research (CFIR) is among the most widely used. Initially proposed by Damschroder et al in 2009,[12] (hereinafter referred to as the original CFIR), it has been widely applied in implementation science. The framework consolidated constructs from multiple implementation theories to provide a shared structure for examining factors that influence the uptake of evidence-based interventions. Although the original CFIR has been extensively applied across clinical and public health settings, several limitations have been noted. First, the framework has been criticized for insufficient clarity and specificity, as some domains and constructs are broadly defined and partially overlapping, making it difficult for researchers to determine how to categorize empirical findings in practice.[13,14] Second, the complexity of the original framework has posed challenges for users, particularly those new to implementation science, leading to inconsistent interpretation and occasional misuse.[15,16] Third, important elements relevant to implementation, such as team functioning and collaborative processes, were not explicitly included, despite substantial evidence indicating their relevance to successful implementation efforts.[17,18] A review by Kirk et al further reported that many published studies either applied CFIR superficially or encountered methodological challenges during its use.[19] To address these concerns, the CFIR development team released a revised version in 2022.[20] The updated CFIR (CFIR 2.0) offers clearer construct definitions, reduces conceptual overlap, and incorporates additional domains that better reflect contemporary understanding of implementation determinants. Compared with the 2009 version, CFIR 2.0 is more comprehensive in scope, more precise in its terminology, and easier for researchers to apply systematically. These refinements make it better suited for analyzing multilevel influences on implementation across diverse healthcare contexts.

In view of these considerations, this review adopts the updated CFIR 2.0 framework to examine how exercise-based cardiac rehabilitation is implemented in China and what factors influence its delivery and use by synthesizing available evidence in a structured way, clarify the main challenges and supportive conditions identified across studies, and provide a foundation for developing more practical and context-appropriate strategies to strengthen cardiac rehabilitation within the Chinese healthcare system.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review process included a comprehensive literature search, screening and organization of eligible studies, systematic data extraction, methodological quality appraisal, and synthesis of the extracted findings. The review protocol was prospectively registered with the International Prospective Register of Systematic Reviews (PROSPERO; Registration No. 1017824, March 23, 2025).

Search Strategy

The Chinese search terms included coronary heart disease, heart disease, cardiovascular disease, cardiac rehabilitation, exercise rehabilitation, physical training, exercise, rehabilitation training, rehabilitation exercise, and factors related to barriers or facilitators (冠心病, 心脏病, 心血管疾病, 心脏康复, 运动康复, 运动训练, 运动锻炼, 康复训练, 康复锻炼; 阻碍因素, 障碍因素, 促进因素, 影响因素). The English keywords covered a similar range and included coronary heart disease, coronary disease, cardiovascular disease, coronary artery disease, cardiac rehabilitation, sports rehabilitation,

Table 1 Search Strategy for Identifying Studies on Exercise-Based Cardiac Rehabilitation in Patients with Coronary Heart Disease

ID	Search Terms*
#1	("coronary heart disease" OR "coronary artery disease" OR "coronary disease" OR "heart disease" OR "cardiovascular disease" OR CHD OR CAD) AND ("cardiac rehabilitation" OR "exercise rehabilitation" OR "rehabilitation exercise" OR "exercise training" OR "physical training" OR "exercise therapy")
#2	(barrier* OR obstacle* OR challenge* OR "inhibiting factor*" OR hinder* OR cessation OR facilitator* OR promot* OR enabler* OR enhanc* OR encourag* OR "influencing factor*")
#3	#1 AND #2

Notes: *The strategy was adapted for each database, using subject headings (eg MeSH/Emtree) where available and equivalent Chinese terms for searches in Chinese databases.

sports training, exercise therapy, rehabilitation training, rehabilitation exercise, and exercise rehabilitation, in addition to terms related to implementation determinants such as barriers, obstacles, challenges, inhibiting factors, hindering factors, cessation, facilitators, enablers, promoting, enhancing, encourager, and influencing factors.

These terms were used individually or in combination with Boolean operators (AND/OR), as detailed in Table 1. A systematic search was conducted in PubMed, Web of Science, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Chinese Biomedical Literature Database (CBM), China National Knowledge Infrastructure (CNKI), the VIP Database for Chinese Technical Periodicals (VIP), and the WanFang database, covering publications up to October 2024. Both Chinese- and English-language original research articles were eligible for inclusion. To ensure comprehensive retrieval, the keyword list was developed using terminology drawn from prior studies, grey literature, primary research, and PubMed indexing terms.

The search strategy followed the Population, Intervention, Comparison, and Outcome (PICO) framework,[21] in which the Population included patients with coronary heart disease as well as the healthcare professionals or caregivers involved in delivering or supporting exercise-based rehabilitation. The Intervention referred broadly to exercise rehabilitation, encompassing structured exercise programmes, supervised or prescribed exercise training, and rehabilitation activities integrated into routine cardiac care. Because the purpose of this review was to examine factors influencing implementation rather than compare interventions, the Comparison component was not applicable. The Outcome element focused on the range of factors described in the literature as shaping the implementation of exercise-based cardiac rehabilitation, including reported facilitators, barriers, and other influences on programme delivery or patient participation.

Study Selection

All identified records were imported into a reference management database, after which titles and abstracts were screened to determine potential relevance. Full texts of the remaining articles were then reviewed independently by two authors. Any discrepancies in judgment were discussed and resolved through consensus. For each study that passed full-text screening, key information was extracted and organized into summary tables to assess alignment with the inclusion criteria.

Inclusion Criteria

Studies were eligible if they met the following requirements: (1) the analysis examined factors corresponding to the five domains of the CFIR framework,[20] namely Innovation, External Factors, Internal Factors, Individual Characteristics, and Implementation Process; and (2) the study design consisted of qualitative, quantitative, or mixed-methods research.

Exclusion Criteria

Studies were excluded if they were: (1) conference abstracts, papers with incomplete data, or studies for which the full text could not be retrieved; (2) review articles, systematic reviews, other forms of secondary literature, or duplicate publications; and (3) publications written in languages other than Chinese or English.

Data Extraction

The initial search yielded 3,963 records. After removing 927 duplicates, the remaining studies' titles and abstracts were screened by a second reviewer. Disagreements were discussed and resolved with the involvement of a third researcher when necessary. Of these, 2,953 were excluded because they did not address the topic of interest, based on title or content. One additional study was excluded because the full text could not be obtained. A total of 20 studies met all inclusion criteria and were included in the final analysis.

Quality Assessment Process

Two authors independently assessed the methodological quality of all included studies using the Mixed Methods Appraisal Tool (MMAT), which evaluates five categories of empirical research: qualitative studies, randomized controlled trials, non-randomized studies, quantitative descriptive studies, and mixed-methods studies. For each study type, the MMAT comprises five appraisal questions, with each item rated as "yes," "no," or "can't tell." A "yes" response is awarded one point, whereas the other responses are scored as zero. Higher scores therefore indicate stronger methodological quality, and studies attaining more than 50% of the maximum score were classified as high quality (Table 2). After completing the appraisal, the relevant text and findings from each study were extracted and organised according to the review questions.[22]

Table 2 Methodological Quality of Included Studies Assessed Using the 2018 Mixed Methods Appraisal Tool (MMAT)

Selected Studies	Appraisal Quality	Quantitative Non-Randomized Criteria				
		Are the Participants Representative of the Target Population?	Are Measurements Appropriate Regarding both the Outcome and Intervention (or Exposure)?	Are there Complete Outcome Data?	Are the Confounders Accounted for in the Design and Analysis?	During the Study Period, is the Intervention Administered (or Exposure Occurred) as Intended?
Zhu H, 2020[23]	Yes	No	Yes	Yes	Yes	Yes
Beatty AL 2017[24]	Yes	Yes	Yes	Yes	Undetermined	Yes
Borg S 2019[25]	High	Yes	Yes	Yes	Yes	Yes
Tu Jiahui 2021[26]	Yes	Yes	Yes	Yes	Yes	Undetermined
		Quantitative descriptive Criteria				
		Is the sampling strategy relevant to address the research question?	Is the sample representative of the target population?	Are the measurements appropriate?	Is the risk of nonresponse bias low?	Is the statistical analysis appropriate to answer the research question?
Perk J 2015[27]	Yes	Yes	Yes	No	Yes	Yes
Gao Wei 2022[28]	Yes	No	No	Yes	Yes	Yes
Almoghairi AM 2024[29]	Yes	Yes	No	Yes	Yes	Yes
Xia C 2024[30]	Yes	Yes	Yes	Yes	Undetermined	Yes

(*Continued*)

Table 2 (Continued).

Højskov IE 2020[31]	High	Yes	Yes	Yes	Yes	Yes
Jung HG 2021[32]	Yes	Yes	Yes	No	Yes	Yes
de Melo Ghisi GL 2014[33]	High	Yes	Yes	Yes	Yes	Yes
		Mixed methods Criteria				
		Is there an adequate rationale for using a mixed-methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?
Lu M, 2020[34]	Yes	Yes	Yes	Yes	Undetermined	Yes
Yang Z, 2023[35]	Yes	Yes	Yes	Yes	Yes	N
Gao Ying 2021[36]	Yes	Yes	Yes	Undetermined	Yes	Yes
Zhai Jia 2019[37]	Yes	Yes	Yes	Yes	Undetermined	Yes
Wongvibulsin S 2021[38]	High	Yes	Yes	Yes	Yes	Yes
		Qualitative Criteria				
		Is the qualitative approach appropriate to answer the question?	Are the qualitative data collection methods adequate to address the research question?	Are the findings adequately derived from the data?	Is the interpretation of results sufficiently substantiated by data?	Is there coherence between qualitative data sources, collection, analysis and interpretation?
Pelliccia A 2021[39]	Yes	Yes	Yes	Yes	Yes	Yes
Hao Y 2022[40]	Yes	Yes	Yes	Yes	No	Yes
Andersen JH 2021[41]	Yes	Yes	Yes	Yes	No	Yes
O'Toole K 2019[42]	High	Yes	Yes	Yes	Yes	Yes

Statistical Analysis

Given the included studies varied considerably in design, methodology and outcome measures, a unified quantitative synthesis was not appropriate. Instead, a descriptive analytical approach was used. All extracted findings were reviewed and coded according to the five domains of the CFIR framework, which allowed us identify how each study described

facilitators and barriers within the Innovation, External Factors, Internal Factors, Individual Characteristics, and Implementation Process domains, and to summarize patterns that emerged across studies.

Results

Identification and Selection of Studies

The database search yielded 3,963 records from seven sources: CNKI (322), WanFang (1,229), VIP (554), CBM (1,589), PubMed (130), CINAHL (112), and Web of Science (24). After 927 duplicates had been removed, 3,036 records remained for title and abstract screening. In this step, 2,953 records were excluded as not relevant to the review question, and 83 full texts were examined in detail. After full-text assessment by three reviewers against the predefined criteria, 20 studies were retained for inclusion in the final synthesis (Figure 1).

Quality of the Included Studies

Twenty empirical studies[23–42] were included: four qualitative, eleven quantitative, and five mixed-methods. Most met the basic methodological requirements, although several notable limitations were identified. Among the qualitative studies, two did not provide sufficient data to substantiate their main findings,[40,41] and one offered limited evidence for its interpretations and displayed inconsistencies across data sources, data collection, analysis, and interpretation.[39] Within the quantitative studies, one failed to describe its sampling method,30 two applied inclusion and exclusion criteria that restricted representativeness,[23,28] two used measurement tools of suboptimal quality,[27,32] and one did not adequately account for potential confounding factors in its design.[33] In the mixed-methods group, one study reported its quantitative intervention in a manner that prevented reliable replication.[35]

Across the 20 included studies, the factors extracted in this review mapped to 24 CFIR 2.0 constructs spanning all five CFIR domains. In total, 28 distinct facilitators and 34 distinct barriers to exercise-based cardiac rehabilitation in patients with coronary heart disease were identified (Table 3).

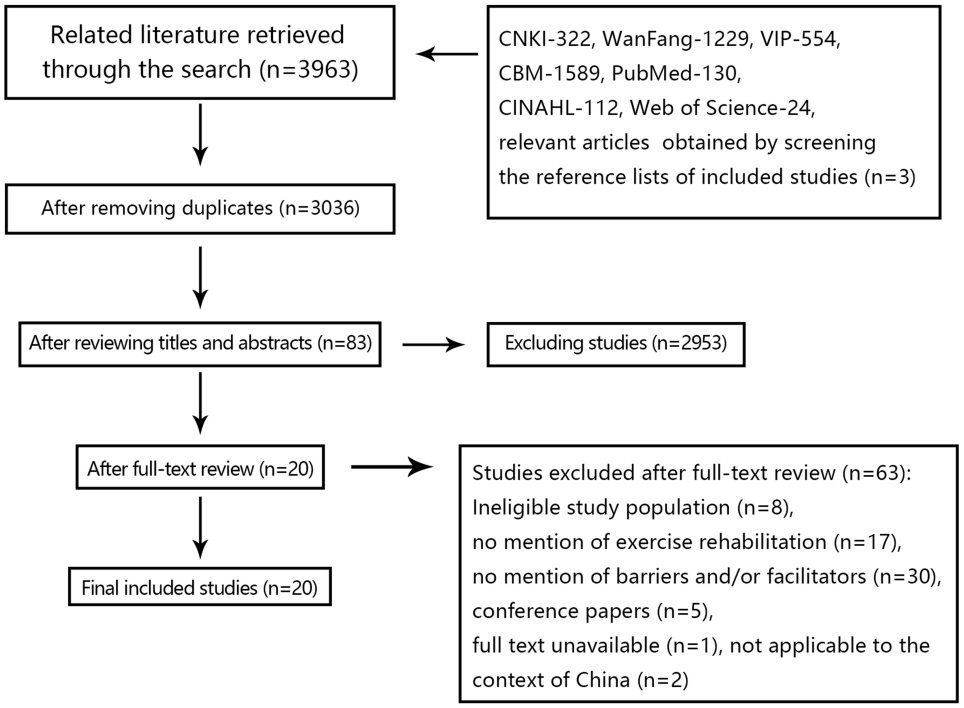

Figure 1 PRISMA flow diagram.

Table 3 Facilitators and Barriers to Exercise-Based Cardiac Rehabilitation in Chinese Patients with Coronary Heart Disease, Organised by the CFIR 2.0 Domain

Dimensions	Concept Element	Facilitators	Barriers
1. Innovation Field	Trialability of innovation	① Easy execution of the prescription[39]	① Abstract nature of the prescription[29,37,39,42]
	Design of innovation		① Lack of evaluation tools[43,44]
	Adjustability of innovation	① Wearable devices make it easy to adjust the prescription[38,45,46]	
2. External Factors Domain	Local perceptions		① Preference for medication over exercise[23,29,35,39,40]
	Local conditions	① Good economic development in Central and South China;[42] ② Traditional Chinese medicine practices (Tai Chi, Baduanjin);[37,47,48] ③ Community rehabilitation available[36]	① Economically underdeveloped regions in Northwest and Southwest China[42]
	Cooperation & liaison		① Lack of professional team collaboration[41]
			② Incomplete referral system[48]
	Policy & regulations		① Lack of medical-insurance support[27,28,31,34,37,40]
	Funding support	① Availability of funding[26]	① Lack of funding support[41]
3. Internal Factors Domain	Hardware infrastructure		① Space constraints[23,29,35,36,39]
	Information-technology infrastructure		① Lack of necessary software/ equipment[41,42]
	Operational infrastructure	① Positive organizational climate[26]	① Incomplete structure of rehabilitation personnel[41]
	Related associations (team collaboration)	① Rehabilitation team established[26]	① Lack of inter-team collaboration[41,42]
	Urgency for innovation	① Recognition of urgency[49,50]	
	Compatibility		① Incompatibility with nursing workflow[41,42]
	Available resources	① Advanced, safe equipment[26]	① Inconvenient transportation[23,35,39]
	Accessibility of knowledge and information		① Patients' lack of access to knowledge/information[29,41]

(*Continued*)

Table 3 (Continued).

Dimensions	Concept Element	Facilitators	Barriers
4. Individual Domain	Senior leaders		① Lack of support from capable leaders[41]
	Implementation supervisors	① Good promotion opportunities[26]	① Medical staff lack conviction[23,41]
		② Younger nurses in tertiary hospitals[42]	② Mismatch between role identity and job content[37]
		③ Positive attitudes and strong commitment[37]	
		④ Supervisors are male, highly educated, high-income, and hold senior titles[26]	
	Other implementation supporters	① High demand from primary caregivers[33]	① Low level of family resilience[29,34,35,39,40]
		② High level of family resilience[24,25,30,35,36,39,40]	
	Innovation adopters	① Good disease awareness[30,31,36,39,40]	① Poor knowledge, attitudes, or beliefs[23,27,28,31]
		② High self-efficacy[24,25,30,35,39,40]	② Low self-efficacy[24,34–36,39,40]
		③ Younger age[24,35]	③ Heavy economic burden[23,27,28,34]
		④ Regular exercise habits[30,31,39]	④ Older age[23,24,27,28,31,35]
		⑤ Positive prior experience[39]	⑤ Exercise-related fear[24,31,32,39,40]
		⑥ Higher education level[27,28,31,32]	⑥ No habitual exercise[24,39]
		⑦ No prior medical history[23]	⑦ Negative experiences, anxiety/ depression[25,29,35,39]
		⑧ Male gender[27,32]	⑧ Lower education level[31,34,35]
		⑨ Non-smoker[37]	⑨ Disease symptoms/ complications[24,31,32,39]
			⑩ Female gender[27,32,35]
			⑪ Ethnic minority status[31]
	COM-B-based role characteristics		① Healthcare providers lack willingness and behavioral strategies to recommend cardiac rehabilitation[41]
5. Implementation Process Domain	Team formation		① Lack of deliberate team coordination and collaboration[41]
	Assessing needs	① Daily exercise check-in aligned with patients' interests[39]	
	Execution	① Mobile network applications[30,32]	① Failure to monitor outcomes in a timely manner[41]
		② Cloud platforms improve adherence and meet exercise-rehabilitation needs[38]	② Lack of education on rehabilitation pathways[27]

Factors Affecting Implementation

Innovation Domain

At the level of the intervention itself, exercise-based cardiac rehabilitation programmes that were clearly structured, easy to understand, and straightforward to follow were more readily accepted by patients and were easier for staff to deliver in routine practice.[39] With the expansion of digital health, some studies described the use of mobile health applications to support rehabilitation, allowing real-time monitoring of exercise-related data and timely adjustment of prescriptions; this flexible and responsive mode of delivery was generally perceived by patients as convenient and reassuring.[38] However, important shortcomings in programme design were also reported. In several institutions, exercise prescriptions lacked specificity with respect to type, intensity, and progression of exercise, and genuinely individualised plans were uncommon.[29,37,39,42] Programme development was seldom based on a comprehensive assessment of patients' clinical status, functional capacity, and preferences, which limited the appropriateness and feasibility of the prescribed interventions. Furthermore, there is limited Chinese research that systematically describes actual participation and adherence patterns in exercise-based cardiac rehabilitation, and validated tools for assessing these aspects in local settings are still scarce.[39]

External Factors Domain

Regional variation in economic development and health-care investment was reflected in the availability and organisation of cardiac rehabilitation. In more economically developed areas, particularly parts of Central and Southern China, cardiovascular nurses reported greater involvement in rehabilitation, supported by stronger funding, more specialised equipment, and larger dedicated spaces.[26,36,42] In some of these settings, hospitals had also begun collaborating with community services to deliver community-based rehabilitation, thereby extending access beyond tertiary centres. Traditional Chinese medicine was found to play an important role as well, with exercise practices such as Tai Chi, Baduanjin, and the Five-Animal Frolics being widely recognised and trusted by many patients and frequently incorporated as culturally acceptable rehabilitation modalities.[37] At the same time, several external barriers were consistently reported. Under the dominant biomedical model, many patients place greater emphasis on drugs and procedures than on rehabilitation and remain unaware of the role of structured exercise in secondary prevention, contributing to a largely reactive approach to chronic disease management.[23,29,35,39,40,51] In economically underdeveloped regions, such as the Northwest and Southwest, hospitals often lack well-established rehabilitation departments, and shortages of medical resources, trained rehabilitation personnel, and rehabilitation nursing services are common. The referral system is underdeveloped, and rehabilitation concepts lag behind current standards.[37,41,42] Moreover, in most parts of China, cardiac rehabilitation is not yet covered by national health insurance schemes, requiring patients to pay most rehabilitation-related costs out of pocket, which remains a major deterrent to participation.[23,27,29,36,39,41]

Internal Factors Domain: Facilitators

Within institutions, increasing attention to chronic disease management has led some patients and professionals to place greater value on exercise rehabilitation as a means of improving quality of life.[4,25,30,35,36] In several hospitals, efforts have been made to strengthen multidisciplinary teams, clarify roles and responsibilities, and invest in monitoring equipment to deliver safer and more standardised exercise-based interventions.[26] These developments have created a more supportive organisational context for implementation. However, inner-setting constraints remain substantial, as most programmes continue to be hospital-based, and available space and equipment are often insufficient to accommodate growing demand.[23,29,35,36,39,41,42] Many institutions still face clear gaps in facilities, devices, and staffing, and interdepartmental collaboration remains limited. In daily practice, a single nurse may be responsible for exercise rehabilitation in addition to multiple other clinical duties, resulting in heavy workloads and frequent interruptions that compromise continuity of care.[23,29,35,36,39,41,42] For patients living in remote areas—particularly older adults—travel to hospital-based services is challenging.[23,29,35,39,41] Limited educational attainment and restricted access to trustworthy health information further hinder their ability to obtain clear and reliable guidance on cardiac rehabilitation.

Individual Domain

At the individual level, patients who had a clearer understanding of their disease, stronger self-efficacy, and established exercise habits were more likely to recognise the value of cardiac rehabilitation and to engage with programmes. This pattern was particularly evident among better-educated, non-smoking men who were primary income earners and therefore acutely aware of how illness might affect their work and family responsibilities.[23–25,27,28,30–32,35,36,39,40] Among health-care professionals, higher educational attainment was associated with greater motivation to recommend and deliver exercise-based cardiac rehabilitation.[26,37,42] Family members also played a central role: when families provided sustained practical and emotional support and demonstrated high resilience, patients reported increased confidence and were more willing to participate in rehabilitation exercises.[24,25,30,33,35,36,39,40] In contrast, limited support from institutional leaders,[41] combined with suboptimal workforce allocation and performance appraisal systems, reduced staff enthusiasm for rehabilitation activities. Role-based analyses grounded in the Capability, Opportunity, Motivation–Behaviour (COM-B) framework indicated that 43.5% of nurses reported insufficient knowledge of exercise rehabilitation and uncertainty about how to offer appropriate guidance.[37,41] Many professionals lacked both the intention and the concrete behavioural strategies needed to routinely recommend cardiac rehabilitation to eligible patients. On the patient side, older adults frequently faced age-related declines in strength and balance and were concerned about falls or symptom exacerbation during exercise.[23,24,27,28,31,32,35,39,40] Fear of worsening their condition further increased psychological burden and contributed to reluctance to participate in structured exercise programmes.[23,24,27,28,31,32,35,39,40]

Implementation Process Domain

Regarding the implementation process, studies describing more successful programmes emphasised tailoring interventions to patients' interests, daily routines, and rehabilitation needs, as well as developing specific, individualised exercise plans.[30,32,38,39] When patients perceived that prescriptions were adapted to their circumstances and that safety was being closely monitored, adherence and engagement were generally higher.[30,32,38,39] In contrast, other reports identified weak coordination within rehabilitation teams and limited monitoring of intervention fidelity and outcomes.[27,41] The lack of a clear, closed-loop management process reduced accountability and hindered timely adjustment of programmes in response to patients' progress or difficulties.[27] In addition, insufficient communication about referral pathways and programme structure meant that healthcare professionals could not always provide complete or consistent information to patients, further undermining uptake of exercise-based cardiac rehabilitation.

Discussion

This systematic review shows that the primary barriers to exercise-based cardiac rehabilitation in China are concentrated within the internal (organisational) and individual domains. At the organisational level, many institutions face limitations in space, equipment, and staffing, along with weak interdepartmental collaboration and the absence of mature rehabilitation workflows. These constraints suggest that rehabilitation services are frequently appended to already demanding clinical workloads rather than embedded into routine care pathways. At the individual level, both healthcare professionals and patients often lack adequate knowledge, skills, and confidence regarding exercise rehabilitation. Providers may be uncertain about how to prescribe and monitor exercise safely, whereas patients commonly have limited awareness of rehabilitation benefits, face substantial financial pressure, and experience anxiety about triggering adverse events. Low family resilience and limited practical support at home further diminish the likelihood of sustained participation. Collectively, these organisational and individual barriers help explain why exercise-based cardiac rehabilitation remains underutilised despite its well-established benefits for patients with coronary heart disease.

Financial and policy constraints further exacerbate these structural challenges. In most regions, cardiac rehabilitation is not included in routine national health insurance coverage, leaving patients responsible for the majority of rehabilitation costs.[43,44] For many families, particularly those in less developed areas, these expenses constitute a substantial deterrent, even when interest in rehabilitation exists. The absence of formal recognition and performance incentives for rehabilitation work also diminishes provider motivation and limits managerial support. These observations align with previous reports showing that Chinese healthcare professionals often remain sceptical about rehabilitation outcomes, fear making mistakes or causing adverse events, and receive limited institutional backing for rehabilitation activities.[45] In this

review, many providers were hesitant to recommend cardiac rehabilitation and were uncertain about how to integrate it into routine practice. These findings mirror those of Erica et al, who emphasised that successful implementation of exercise-based cardiac rehabilitation requires dedicated, well-trained rehabilitation teams and a supportive organisational environment.[46]

The CFIR-based analysis indicated that barriers and facilitators were present across all five domains, with some resembling international findings and others reflecting features specific to the Chinese healthcare context. External structural barriers—such as uneven regional development, weak referral systems, and shortages of rehabilitation departments—are broadly consistent with reports from resource-constrained settings, whereas the near-absence of insurance reimbursement and the entrenched hospital-centred service model are particularly pronounced. At the same time, several context-specific facilitators emerged. The expanding use of mobile and wearable technologies provides a practical means to deliver remote supervision and to adjust exercise prescriptions in real time, which may be especially valuable for patients who live far from tertiary centres or face competing work and family demands.[47,48] This enhances the adaptability of exercise prescriptions and aligns interventions more closely with patients' needs. In addition, traditional Chinese exercises such as Tai Chi and Baduanjin are widely accepted and can be performed safely by older adults with minimal space and equipment;[49,50] incorporating these culturally familiar practices into structured programmes may increase acceptability and adherence. Family members also play an especially central role in decision-making and daily care, and strong family involvement was consistently associated with better engagement in rehabilitation.

Evidence relating to the innovation and implementation-process domains remains limited, although the available studies indicate several promising directions. Programmes grounded in careful assessment of patients' clinical status and preferences, offering clear and tailored exercise prescriptions, and providing regular feedback and monitoring appear more likely to support sustained participation. Conversely, vague or generic prescriptions, weak coordination within the clinical team, and the absence of closed-loop management systems undermine implementation and constrain timely adaptation when challenges arise. These findings underscore the need to strengthen standardised assessment procedures, clarify responsibilities within multidisciplinary teams, and integrate rehabilitation into explicit care pathways rather than positioning it as an optional adjunct.

Taken together, this review identifies several priorities for policy and practice. Expanding insurance coverage and financial support for cardiac rehabilitation could address an important structural barrier and signal stronger policy commitment. Strengthening rehabilitation teams through targeted training, clearer role delineation, and appropriate performance incentives may also enhance professional confidence and motivation. At the service-delivery level, combining hospital-based programmes with community- or home-based models, supported by mobile health technologies and culturally familiar exercise forms such as Tai Chi and Baduanjin, may extend programme reach and improve adherence among older adults and those living in remote areas. As exercise-based cardiac rehabilitation in China remains at an early developmental stage, these context-specific strategies, informed by CFIR 2.0 mapping of multilevel determinants, provide a practical foundation for designing and evaluating future implementation initiatives.

Limitations

This study has several limitations that warrant consideration. First, the evidence base is dominated by observational, single-centre studies, which limits the ability to draw causal conclusions about the relationships between implementation determinants and outcomes. Second, several included reports are master's or doctoral theses and articles published in lower-impact domestic journals. Their inclusion aimed to mitigate publication bias and capture early, context-specific experiences from Chinese centres where exercise-based cardiac rehabilitation remains in development. However, reliance on such sources reduces the overall certainty and generalisability of the findings, which should be interpreted as descriptive and hypothesis-generating. Third, no formal ranking of individual barriers and facilitators by relative importance was conducted, meaning this synthesis cannot specify which determinants should be prioritised in practice. Future research should quantify and compare the influence of key factors to support implementation planning. Fourth, all eligible studies were published before 2024, and thus more recent evidence may not be reflected. Finally, the restriction to Chinese- and English-language publications, combined with dependence on database indexing and the terminology

used by original authors, indicates that some relevant studies—particularly those reported under alternative descriptors or in other languages—may have been overlooked.

Conclusion

Using the CFIR 2.0 framework, this systematic review synthesises current evidence from China on exercise-based cardiac rehabilitation for coronary heart disease and demonstrates that implementation is shaped by influences across policy, organisational, professional, patient, and family domains. Limited insurance coverage and reimbursement, shortages of trained personnel and rehabilitation infrastructure, low awareness and referral rates, and concerns about safety among older adults or those with comorbidities were consistently associated with poor participation. In contrast, well-defined institutional protocols, multidisciplinary teams, strong family involvement, and mobile or home-based delivery models supported higher uptake. Mapping these findings onto the CFIR 2.0 domains clarifies where policy initiatives, such as expanding insurance coverage and enhancing rehabilitation capacity, and local implementation strategies, including staff training, structured referral systems, and digital tools, are most likely to be effective under current Chinese conditions. These findings offer a China-specific reference for policymakers and clinicians working to expand cardiac rehabilitation and provide a practical framework for planning and assessing future implementation studies and international comparisons.

Acknowledgments

We sincerely thank all the authors for their hard work. We also appreciate Qing Zhao, Siyuan Liu, and Yuting Wan for their assistance in collecting and organizing part of the data for this paper.

Funding

No funding was obtained for this work.

Disclosure

The author(s) report no conflicts of interest in this work.

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