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Barriers to Physical Activity in Patients with Diabetic Cardiomyopathy: A Qualitative Study on Perceived Risks and Motivational Challenges

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Abstract

Background:
Diabetic cardiomyopathy (DCM) is a distinct but underrecognized complication of diabetes mellitus, characterized by myocardial dysfunction in the absence of overt coronary artery disease or hypertension. While physical activity is a core component of cardiac rehabilitation, little is known about how older adults with DCM perceive and engage with exercise, particularly within diverse sociocultural contexts.

Methods:
This qualitative study explored perceived barriers to physical activity among older adults with DCM. Semi-structured interviews were conducted with 11 patients recruited from the geriatrics department of a tertiary hospital in Nanjing, China. Thematic analysis was used to identify recurring patterns in participants' narratives related to psychological, sociocultural, and systemic influences on exercise behavior.

Results:
Four key themes emerged: (1) limited disease awareness and diagnostic ambiguity, (2) fear of symptom exacerbation and kinesiophobia, (3) cultural beliefs emphasizing energy conservation and bodily protection, and (4) lack of individualized guidance in existing rehabilitation services. Participants often framed physical activity decisions through culturally influenced perceptions of risk, expressing hesitancy due to perceived frailty and lack of tailored support.

Conclusion:

This study identified four interconnected barriers to physical activity in patients with diabetic cardiomyopathy: diagnostic ambiguity, fear of symptom exacerbation, family and age-related expectations, and limited individualized guidance from health professionals. These barriers were mutually reinforcing and reflected not only personal concerns but also gaps in routine care. Improving physical activity in this high-risk population requires both patient-focused strategies—such as clear communication and tailored reassurance—and system-level measures, including consistent referral pathways, greater rehabilitation availability, and family-inclusive support.

1. Introduction

Diabetic cardiomyopathy (DCM) is a distinct clinical entity characterized by structural and functional myocardial abnormalities occurring in individuals with diabetes mellitus, independent of coronary artery disease or hypertension [1, 2]. It represents an underrecognized but clinically significant contributor to the development of heart failure, accounting for a growing burden of morbidity and mortality among older adults with diabetes [3] . As populations age and diabetes prevalence continues to rise, DCM poses a critical challenge to secondary prevention and rehabilitation efforts in chronic cardiovascular care.

Although pharmacologic treatment remains the cornerstone of DCM management, accumulating evidence highlights the indispensable role of lifestyle modification—particularly regular physical activity—in improving glycemic control, vascular function, and myocardial remodeling[4]. However, despite these established benefits, engagement in structured exercise remains strikingly low among patients with DCM. This is not solely a matter of individual preference but reflects a complex interplay of physiological limitations, psychological barriers, and systemic gaps in rehabilitation support. Patients frequently report fatigue, dyspnea, or discomfort during exertion, and uncertainty regarding safe levels of activity often leads to avoidance behaviors [5, 6]. Moreover, under-recognition of DCM in routine practice means that many patients are inadequately informed about their diagnosis, contributing to confusion about its nature and management [7]. As a result, both clinicians and patients may underestimate the need for condition-specific education and individualized exercise counseling.

In routine clinical care, structured cardiac rehabilitation programs are not universally available. In many settings, including China, rehabilitation is primarily offered in tertiary hospitals, while patients managed in primary care often receive only general advice such as “exercise more,” usually delivered by physicians or nurses without individualized follow-up. Where rehabilitation is available, it typically comprises aerobic and resistance training combined with education, but access is limited and referral is inconsistent. This context leaves many older adults with DCM without adequate guidance or support.

While studies in type 2 diabetes and heart failure populations have documented general barriers to exercise—such as fear of symptom worsening, low self-efficacy, and limited access to structured programs [8, 9] —the unique challenges faced by patients with DCM remain poorly understood. Unlike other cardiac conditions, DCM combines metabolic dysregulation with subclinical myocardial dysfunction, producing a distinct psychological and physiological profile that may amplify risk perceptions and uncertainty toward physical activity. Yet, to date, little is known about how these patients interpret professional advice, reconcile medical recommendations with cultural norms, or make daily decisions regarding exercise participation.

To address this gap, the present study adopts a qualitative approach to explore perceived barriers to physical activity among older adults with DCM. By examining patients’ lived experiences within their sociocultural and clinical contexts, this study seeks to identify the mechanisms through which diagnostic ambiguity, fear, and cultural beliefs shape exercise behaviors. Understanding these dynamics is essential for developing targeted, culturally sensitive strategies to enhance physical activity engagement and inform individualized cardiac rehabilitation models for this high-risk population.

2. Methods

2.1 Study Design

This study employed a qualitative descriptive design using semi-structured interviews to explore the perceived barriers to physical activity among patients diagnosed with diabetic cardiomyopathy (DCM). A phenomenological approach was adopted to capture the lived experiences of participants, with particular emphasis on how they interpret physical limitations, internal motivations, and psychosocial influences surrounding exercise engagement. A phenomenological orientation was chosen because it is particularly suited to uncovering how individuals make sense of their health experiences and embodied conditions[10].

All participants provided written informed consent prior to participation. Confidentiality and anonymity were strictly maintained throughout data collection, transcription, analysis, and dissemination. Participants were informed of their right to withdraw from the study at any time without consequence. This study was approved by the Nanjing Centeral Hospital (Approval (2025) Ethics Review No. (15)). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to the interviews.

2.2 Participants and Setting

Participants were recruited from the Department of Geriatric Medicine at a tertiary general hospital, Nanjing, Jiangsu Province, China, between May and August 2025. Eligible individuals were aged 40 years or older, diagnosed with type 2 diabetes mellitus and confirmed DCM based on echocardiographic findings, including diastolic dysfunction or structural myocardial changes. Additional inclusion criteria included clinical stability, ability to provide informed consent, and sufficient communication capacity in Chinese. Individuals with a prior history of myocardial infarction, New York Heart Association class III or IV heart failure, or severe cognitive impairment were excluded.

Purposive sampling was employed to ensure variability in demographic and clinical characteristics, including age, sex, disease duration, and prior exercise history. Sampling continued until thematic saturation was reached, defined as the

point at which no new conceptual categories emerged from successive interviews. Eleven participants were included in the final analysis.

2.3 Data Collection

Interviews were conducted either in a private room at the clinic or via encrypted videoconferencing platforms, depending on participant preference and institutional public health policies. Each interview followed a semi-structured guide developed according to the Capability–Opportunity–Motivation Behavior (COM-B) model. Core interview domains included patients' understanding of their diagnosis, perceived role of physical activity in disease management, motivational and emotional influences, environmental facilitators and constraints, and prior exercise experiences. (see Additional file 1).

The semi-structured interview guide was developed specifically for this study by the research team, informed by the COM-B model and relevant literature, and was not previously published. The guide was originally drafted in Chinese, pilot-tested with two patients, and refined for clarity and flow. An English-language version of the finalized interview guide is provided as Additional file 1 and is cited here.

All interviews were conducted by trained qualitative researchers and lasted between 30 and 60 minutes. Interviews were audio-recorded with the participants' consent. The interviews were conducted by two trained qualitative researchers with a nursing background (master's level), under the supervision of a senior qualitative research expert.Field notes were taken during and immediately after the interviews to capture non-verbal communication and contextual nuances. Transcripts were anonymized and reviewed by the interviewer for accuracy.

2.4 Data Analysis

Verbatim transcripts were analyzed thematically using the six-phase framework developed by Braun and Clarke[11]. Thematic analysis was selected for its methodological flexibility and its appropriateness for identifying both explicit and latent patterns within participants' narratives. This approach was considered well-suited to our dataset as it allowed us to generate themes that reflected patients' psychological fears, sociocultural beliefs, and perceptions of clinical support. Two independent researchers coded the data iteratively, initially performing open coding and subsequently organizing codes into preliminary themes. Discrepancies in coding were resolved through consensus discussion, and a senior qualitative researcher was consulted in cases of unresolved divergence. NVivo software (version 20.0) was used to assist with data management and coding processes.

The trustworthiness of the analysis was enhanced by investigator triangulation, audit trails of analytic decisions, and member checking with a subset of participants to validate interpretations. Data saturation was deemed achieved when no new codes or themes emerged from at least two successive interviews.

2.5 Ethics approval and consent to participate

This study was approved by the Nanjing Centeral Hospital (Approval (2025) Ethics Review No. (15)). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to the interviews.

3. Results

A total of 11 older adults with diabetic cardiomyopathy (DCM) participated in the study. Of the 15 patients approached, 11 agreed to participate and 4 declined due to time constraints or lack of interest. The participants' demographic and clinical characteristics are summarized in **Table 1**. Their ages ranged from 65 to 79 years, with a mean age of 70.5 ± 4.2 years with a balanced distribution of men and women. The duration of type 2 diabetes mellitus varied from 8 to 20 years, while

the known duration of DCM ranged from 0.5 years (newly diagnosed) to 8 years (long-term). Based on these data, one participant was newly diagnosed (<1 year), two had long-term disease (>5 years), and the remainder were in the intermediate range (1–5 years).

Prior exercise patterns showed considerable variation. Several participants reported never exercising or being inactive even before their DCM diagnosis, whereas others had a history of walking, moderate activity, or previous structured exercise. Comorbidities were common and diverse, including hypertension, hyperlipidemia, coronary artery disease (CAD), atrial fibrillation (AF), chronic obstructive pulmonary disease (COPD), osteoarthritis, and diabetes-related complications such as neuropathy and retinopathy. These multimorbid conditions often contributed to perceived fragility and influenced decisions about physical activity.

Table 1. Characteristics of study participants

Participant ID	Age (years)	Sex	Duration of T2DM (years)	Known Duration of DCM (years)	Disease stage	Prior exercise before diagnosis	Current exercise history	Comorbidities
P01	67	Male	12	3	Intermediate (1–5 years)	No	Inactive	Hypertension
P02	74	Female	8	2	Intermediate (1–5 years)	Yes	Walking only	Hypertension, Hyperlipidemia Atrial fibrillation
P03	70	Male	15	5	Intermediate (1–5 years)	Yes	Previously active	Coronary artery disease, Obesity
P04	65	Female	10	1	Newly diagnosed (<1 year)	No	Never exercised	Hypertension
P05	79	Male	20	4	Long-term (>5 years)	Yes	Moderate regular activity	Coronary artery disease
P06	68	Female	9	2	Intermediate (1–5 years)	Yes	Walking only	Hypertension, Coronary artery disease
P07	72	Male	14	3	Intermediate (1–5 years)	No	Inactive	COPD, Hypertension, Hyperlipidemia
P08	75	Male	18	5	Long-term (>5 years)	Yes	Previously active	CAD, Diabetic neuropathy
P09	66	Female	11	2	Intermediate (1–5 years)	No	Never exercised	Hypertension Osteoarthritis
P10	71	Female	16	4	Intermediate (1–5 years)	Yes	Walking only	Hypertension, Hyperlipidemia Diabetic retinopathy
P11	69	Male	13	3	Intermediate (1–5 years)	Yes	Moderate regular activity	Hypertension, Hyperlipidemia, Atrial fibrillation

Note: Comorbidities were self-reported or obtained from medical records, and included cardiovascular, metabolic, renal, musculoskeletal, and respiratory conditions. Abbreviations: CAD = Coronary artery disease; COPD = Chronic obstructive pulmonary disease; AF = Atrial fibrillation.

Thematic analysis generated four major themes: (1) ambiguity and denial surrounding diagnosis; (2) fear of symptom exacerbation and perceived fragility; (3) conflict between traditional beliefs and medical advice; and (4) lack of individualized exercise guidance. These themes were not mutually exclusive and frequently overlapped in participants' accounts. For example, fear of worsening symptoms (Theme 2) was often amplified by the absence of professional guidance (Theme 4).

Theme 1: Ambiguity and Denial Surrounding Diagnosis

Participants frequently demonstrated limited understanding of their cardiac condition. Despite having received a DCM diagnosis, many did not perceive it as distinct from their diabetes or aging process. This diagnostic ambiguity contributed to underestimation of disease severity and low perceived urgency to engage in physical activity.

"I thought it was just my diabetes acting up… they said something about the heart being involved, but I didn't really catch it all. I've been diabetic for so long, this just feels like more of the same." (P03, male, 70 years)

"No one explained it clearly. They said 'cardiomyopathy,' but I don't even know what that means. Is it like heart failure? Or is it something else?" (P08, male, 75 years)

"If it was serious, wouldn't I feel something? I don't feel anything out of the ordinary, just a bit tired now and then. That's normal at my age." (P02, female, 74 years)

These quotations reveal that patients often equated DCM with familiar conditions such as diabetes or the natural aging process, which minimized their perception of risk. This reflects not only personal interpretation but also systemic gaps in clinical communication: several participants reported that healthcare professionals did not clearly explain the diagnosis or its implications. The absence of structured education reinforced the idea that DCM was "nothing new," reducing motivation to initiate lifestyle changes such as exercise.

Some participants explicitly denied having heart disease, particularly when asymptomatic. This denial further reduced their motivation to modify behavior. The tendency to underestimate risk overlapped with Theme 2 (Fear of symptom exacerbation) and Theme 4 (Lack of individualized guidance): while some patients avoided exercise because of fear, others did so because they believed no intervention was necessary—both positions were shaped by limited professional support.

Theme 2: Fear of Symptom Exacerbation and Perceived Fragility

Participants frequently described fear as a central barrier to physical activity. Many believed that exertion could worsen their cardiac condition, precipitate dangerous symptoms, or accelerate disease progression. This fear often stemmed from personal bodily sensations and was magnified by uncertainty regarding safe levels of activity.

"When I try to walk faster, I feel my heart racing and get dizzy. I worry I might collapse, so I'd rather stay home." (P07, male, 72 years)

"Climbing stairs makes me short of breath. I'm afraid if I push myself too much, something could happen to my heart." (P02, female, 74 years)

"The doctor said exercise is good, but didn't say how much. If I overdo it, maybe I will damage myself instead." (P08, male, 75 years)

These quotes illustrate how participants interpreted bodily discomfort as a warning signal and translated it into avoidance behaviors. The sense of physical fragility was particularly pronounced among those with multiple comorbidities such as hypertension, coronary artery disease, or chronic kidney disease, which reinforced their self-perception as “too weak” to exercise.

Fear was also shaped by limited professional guidance. In the absence of clear instructions on safe exercise intensity, frequency, and monitoring, patients defaulted to inactivity as the safest option. This indicates that fear was not only an individual psychological response but also a reflection of systemic gaps in education and reassurance.

This theme overlapped strongly with **Theme 4 (Lack of individualized guidance)**, as the absence of professional input left patients uncertain about safety, amplifying their anxiety. It also intersected with **Theme 1 (Ambiguity and denial)**, since patients who minimized the seriousness of their condition simultaneously expressed exaggerated fears when they experienced symptoms.

Theme 3: Conflict Between Traditional Beliefs and Medical Advice

Participants frequently described how cultural norms and long-standing personal beliefs shaped their attitudes toward exercise. In many cases, these beliefs conflicted with medical advice, creating ambivalence or resistance to physical activity.

“In our tradition, older people should rest and save energy, not waste it on walking around.” (P04, female, 65 years)

“My family told me not to do too much. They say, ‘At your age, don’t overexert yourself, it will harm your body.’” (P09, female, 66 years)

“The doctor just said I should exercise more, but it feels against what we were taught. Resting means protecting your health.” (P03, male, 70 years)

These narratives illustrate how patients interpreted exercise advice through the lens of cultural values that prioritize conservation of strength, particularly in older age. Rather than viewing exercise as preventive or therapeutic, many participants perceived it as a potential threat to vitality. When medical advice was provided without culturally sensitive explanation, it was often dismissed or overridden by traditional perspectives reinforced by family members.

The influence of cultural norms also highlighted the role of social expectations: participants often relied on family guidance as much as, or more than, professional recommendations. In the absence of structured education or rehabilitation programs, these traditional beliefs became the dominant framework for decision-making.

This theme overlaps with **Theme 1 (Ambiguity and denial)**, as lack of biomedical clarity allowed cultural explanations to fill the gap. It also intersects with **Theme 2 (Fear of symptom exacerbation)**, because cultural beliefs about fragility reinforced existing anxieties, making patients even more reluctant to engage in physical activity.

Theme 4: Lack of Individualized Exercise Guidance

A consistent theme across participants was the absence of tailored professional guidance on physical activity. Most recalled receiving only general advice, such as “exercise more,” without concrete instructions on what type, intensity, or duration of activity would be safe and effective for their condition. This lack of specificity led to confusion, self-doubt, and ultimately inactivity.

“The doctor just told me to do more exercise, but no one explained what kind or how much. I was left guessing.” (P05, male, 79 years)

"I wanted to ask about exercise, but the consultation was too rushed. They just said, 'Walk a bit every day,' and that was it." (P11, male, 69 years)

"Sometimes I think exercise might help, but I don't know what is safe. Without someone to guide me, I don't dare to try." (P06, female, 68 years)

These accounts demonstrate that the barrier was not merely patients' reluctance, but also systemic shortcomings in healthcare delivery. Without structured rehabilitation services or consistent follow-up, participants lacked the reassurance needed to engage safely in physical activity. For some, the absence of individualized guidance translated directly into fear of harm, reinforcing avoidance behaviors.

This theme reflects broader systemic challenges in chronic disease management, particularly in settings where cardiac rehabilitation is not universally available. Patients often relied on vague, one-time instructions, with no opportunity for clarification or feedback. In this vacuum, family advice or personal beliefs filled the gap, further distancing patients from evidence-based recommendations.

Theme 4 overlapped substantially with **Theme 2 (Fear of symptom exacerbation)**, as lack of guidance amplified patients' anxieties about physical harm. It also intersected with **Theme 3 (Cultural conflict)**, since vague medical advice was easily outweighed by entrenched cultural norms. Taken together, these overlaps highlight how inadequate professional support compounded individual and cultural barriers, leaving patients under-supported in their attempts to exercise.

4. Discussion

This study identified four overlapping barriers to physical activity in patients with diabetic cardiomyopathy (DCM): diagnostic ambiguity and denial, fear of symptom exacerbation, conflict between cultural beliefs and medical advice, and lack of individualized guidance from health professionals. Rather than existing independently, these barriers interacted dynamically,These barriers did not operate in isolation but interacted in ways that reinforced avoidance of exercise. For example, participants who were uncertain about their diagnosis were more likely to rely on family advice advocating rest, while those fearful of symptom worsening found little reassurance in the generic messages they received from clinicians. These interconnections suggest that behavioral disengagement results from the combined influence of informational, psychological, and structural factors rather than from individual choice alone.Importantly, these accounts also reflected the limited opportunities for structured rehabilitation and individualized counselling within routine care.

Our findings extend prior qualitative research in type 2 diabetes and heart failure, where uncertainty, fear, and social influences have been reported as barriers to lifestyle change[12-15]. Consistent with this literature, we observed that participants' interpretations of professional advice were shaped by family perspectives and widely shared assumptions linking older age with rest rather than exertion, which in some cases discouraged engagement in physical activity. Such patterns reflect a sociocultural decision-making framework, as previously documented in cardiovascular populations across diverse contexts, where family support systems exert a central influence on health-related behaviors [16, 17]. These observations should not be understood as patient deficits but as reflections of the broader social context in which health behaviors are negotiated. In the context of DCM, these sociocultural influences intersect with systemic gaps in rehabilitation access and follow-up, further compounding the difficulty of maintaining physical activity.

Participants consistently described receiving only brief, non-specific advice—typically "exercise more"—during outpatient encounters, with little or no individualized follow-up. Formal cardiac rehabilitation (CR) was rarely offered. This finding aligns with international evidence showing that CR is available in only about half of countries worldwide, with marked under-capacity relative to need [18]. In China, registry data demonstrate that CR remains concentrated in tertiary hospitals, with substantial regional disparities and persistently low referral and uptake rates [19]. Even when CR is offered, acceptance and adherence are poor, and dropout rates are high due to factors such as cost, travel, and lack of

understanding of its benefits [19]. Therefore, participants' limited engagement observed in this study should be interpreted not as lack of motivation but as a structural issue reflecting service scarcity and weak continuity of care.

Although patients in our study described fear, uncertainty, and family influences as central barriers, it would be simplistic to attribute the problem solely to individual responsibility. What often appeared as hesitation or lack of motivation was closely tied to the context in which care was delivered. Participants recalled receiving only general advice such as "exercise more," with little opportunity to discuss what type of activity was safe, how much was appropriate, or how to respond if symptoms occurred. Under such circumstances, inactivity was a reasonable protective response rather than passive avoidance. Similar observations have been made in other chronic cardiac populations, where sustained lifestyle change was achieved only when individual efforts were supported by structured, accessible services [20, 21].

Our participants' narratives illustrate how limitations in current healthcare provision directly shaped their behaviour. For example, patients who reported not fully understanding the meaning of a "cardiomyopathy" diagnosis (Theme 1) often linked this to the absence of clear explanations during outpatient encounters, where consultations were brief and focused on medication adjustments rather than lifestyle guidance. Fear of symptom exacerbation (Theme 2) was reinforced by the lack of personalised exercise prescriptions; without parameters for intensity or clear stop-rules, patients defaulted to inactivity as a safer option. Family influences emphasising rest in older age (Theme 3) gained greater weight in decision-making precisely because no structured counselling sessions were available to involve relatives or to address misconceptions. Finally, the theme of insufficient guidance (Theme 4) reflected systemic issues such as the low availability of cardiac rehabilitation programmes, inconsistent referral pathways, and minimal follow-up contacts. Taken together, these patterns underscore that what appears as individual reluctance is largely a product of constrained service provision.

Integrating with broader literature and implications

The greater literature suggests that tailored counselling, structured exercise prescriptions, and ongoing professional support improve adherence and outcomes in chronic cardiac populations [22, 23]. Our study helps contextualize these findings by showing why such interventions may be particularly necessary in DCM: the combination of diagnostic uncertainty, fear, and cultural beliefs creates a fertile ground for disengagement unless counterbalanced by consistent, individualized professional input. Therefore, our suggestions are not speculative but aligned with established evidence, while grounded in the themes that emerged from participants' accounts.

5. Conclusion

This study identified four interconnected barriers to physical activity in patients with diabetic cardiomyopathy: diagnostic ambiguity, fear of symptom exacerbation, family and age-related expectations, and limited individualized guidance from health professionals. These barriers were mutually reinforcing and reflected not only personal concerns but also gaps in routine care. Improving physical activity in this high-risk population requires both patient-focused strategies—such as clear communication and tailored reassurance—and system-level measures, including consistent referral pathways, greater rehabilitation availability, and family-inclusive support.

Declarations

Data Availability Statement:

The data that support the findings of this study are available from the corresponding author upon reasonable request and subject to ethical approval.

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Conflict of Interest Disclosure:

The authors declare that they have no competing interests (financial or non-financial), including no relevant business, personal, or family relationships that could have influenced the work.

Ethics approval and consent to participate

This study was approved by the Nanjing Centeral Hospital (Approval (2025) Ethics Review No. (15)). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to the interviews.

Consent for publication

Not applicable.

Clinical trial number: not applicable.

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