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The Effect of Early Physical Rehabilitation on Health-Related Quality of Life Following Myocardial Infarction: A Narrative Review

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Abstract

Background: Acute myocardial infarction (MI) profoundly impairs health-related quality of life (HRQoL) physically, mentally, and socially. Structured early physical rehabilitation is essential to counter bed rest complications, mitigate systemic inflammation, and optimize patient recovery.

Aim: To synthesize clinical evidence regarding the impact of early exercise-based physical rehabilitation on multi-domain post-MI HRQoL.

Material and methods: Literature was systematically searched across PubMed, PMC, and Google Scholar. Eligible publications evaluated adult post-MI cohorts undergoing early Phase I/II physical mobilization and assessing HRQoL via validated instruments, such as SF-36, EQ-5D, and MacNew QLMI. Approximately 30 studies were qualitatively synthesized.

Results: Generic (SF-36/SF-12) and disease-specific (MacNew global and domain-specific) HRQoL scores show progressive, significant post-intervention gains. Aerobic capacity, specifically VO2max and six-minute walk distance, systematically increases. Psychologically, early mobilization significantly reduces post-MI anxiety, depression, and kinesiophobia, while restoring self-efficacy. Acute Phase I mobilization (initiated safely within 48–72 hours post-PCI) prevents immobilization complications, regresses adverse left ventricular remodeling, and shortens hospital stays. Early Phase II telerehabilitation, utilizing mobile applications and wearable sensors, consolidates these gains with high patient adherence (>80%) and reduced readmissions.

Conclusions: Structured early physical rehabilitation is a safe, highly effective disease-modifying therapy that directly improves post-MI HRQoL. Integrating standardized mobilization protocols and validated HRQoL monitoring tools into routine clinical cardiology workflows is highly recommended.

Keywords: myocardial infarction; cardiac rehabilitation; health-related quality of life; early mobilization; exercise therapy.

1. Introduction

Historically, the therapeutic paradigm following acute myocardial infarction (MI) mandated strict, prolonged bed rest to minimize potential ischemic and arrhythmic complications (Aleksova et al., 2025). However, contemporary clinical science recognizes that prolonged immobilization is highly detrimental, resulting in rapid skeletal muscle wasting, joint contractures, systemic inflammatory activation, and ultimately, a poorer prognosis (Aleksova et al., 2025; Susca et al., 2020). Consequently, the clinical implementation of early physical rehabilitation—encompassing Phase I mobilization during the acute hospitalization stage and subsequent early Phase II outpatient training—has emerged as a safe and effective strategy to optimize post-MI recovery (Aleksova et al., 2025; Schon et al., 2024). Early rehabilitation, particularly when commenced within forty-eight to seventy-two hours post-percutaneous coronary intervention (PCI), has been demonstrated to prevent left ventricular remodeling, preserve myocardial function, reduce systemic inflammation, and shorten overall hospital stay and healthcare costs (Cai et al., 2021; Nakamura et al., 2021; Schon et al., 2024; Susca et al., 2020).

Health-Related Quality of Life (HRQoL) has increasingly become recognized as a primary clinical endpoint of equal importance to hard survival metrics, as the physical and

psychological trauma of an acute coronary syndrome profoundly disrupts patient well-being (Hisam et al., 2022; Limonti et al., 2025). Validated multidimensional instruments—including the Medical Outcomes Study 36-item Short Form Survey (SF-36) along with its abbreviated variants (SF-12 and SF-8), the disease-specific MacNew Quality of Life Myocardial Infarction questionnaire, the Velasco-Del Barrio questionnaire, and the EuroQol 5-Dimensional (EQ-5D/EQ-VAS) scale—are vital for quantifying physical, social, and mental recovery post-MI (Du et al., 2020; Hisam et al., 2022; Limonti et al., 2025; Prabhakaran et al., 2020; Tsai et al., 2019). Comprehensive exercise-based cardiac rehabilitation systematically improves both the physical and mental component summaries of these instruments compared to usual care (Antonakoudis et al., 2006; Dibben et al., 2021; Limonti et al., 2025; Tsai et al., 2019). Moreover, successful participation in and completion of cardiac rehabilitation programs have been directly associated with superior social reintegration, improved self-efficacy, and a more robust recovery of daily functional capacity (Aleksova et al., 2025; Du et al., 2020).

Despite the well-established benefits of exercise-based secondary prevention, several critical gaps persist regarding optimal clinical implementation. Debates remain ongoing regarding the precise timing of mobilization, as guidelines differ on whether rehabilitation should start immediately in-hospital or be delayed to ensure complete hemodynamic stabilization (Aleksova et al., 2025). Furthermore, post-MI recovery is frequently hindered by psychological barriers, such as anxiety, depression, and kinesiophobia (an debilitating fear of movement) that diminishes physical capacity and impairs HRQoL (Bäck et al., 2025; Du et al., 2020; Limonti et al., 2025). Low adherence remains a pervasive challenge, with global rehabilitation participation rates estimated between 10% and 34%, heavily influenced by factors such as advanced age, female sex, low socioeconomic status, and logistical constraints (Limonti et al., 2025; Wang et al., 2023). While mobile health (mHealth) strategies and home-based telerehabilitation have emerged as innovative approaches to alleviate kinesiophobia and improve adherence, their comparative efficacy in enhancing domain-specific HRQoL compared to traditional in-person protocols remains to be comprehensively evaluated (Bäck et al., 2025; Hisam et al., 2022; Limonti et al., 2025).

Research Objective: The primary objective of this narrative review is to synthesize the current clinical evidence regarding the effects of early exercise-based physical rehabilitation on health-related quality of life outcomes in patients following acute myocardial infarction. Specifically, this review aims to clarify how early-onset mobilization protocols systematically influence both the physical functioning and psychological domains of post-infarction recovery.

Research Problems: A critical problem in contemporary cardiology lies in defining the optimal timing and safety parameters for initiating physical mobilization during the acute and subacute phases of myocardial infarction. Additionally, it remains unclear how domain-specific quality of life responses differ between early-onset and delayed rehabilitation cohorts, particularly regarding physical versus emotional dimensions of recovery. Finally, the role of early physical rehabilitation in overcoming major psychological barriers, such as kinesiophobia, post-infarction anxiety, and subsequent therapy non-adherence, remains to be systematically delineated.

Research Hypotheses: It is hypothesized that structured early physical rehabilitation initiated during Phase I or early Phase II post-myocardial infarction significantly enhances both the physical and emotional dimensions of health-related quality of life compared to standard or delayed care. Furthermore, it is hypothesized that early exercise-based interventions serve as an effective therapeutic mechanism to reduce kinesiophobia and anxiety, thereby facilitating better long-term treatment adherence and functional reintegration.

2. Research materials and methods

The target patient cohort analyzed across the synthesized literature comprises adult patients recovering from an acute myocardial infarction or acute coronary syndrome who participated in Phase I (in-hospital) or early Phase II (early post-discharge outpatient or home-based) structured physical mobilization and cardiac rehabilitation programs (Aleksova et al., 2025; Schon et al., 2024). To establish a highly focused clinical evidence base, eligibility criteria were defined to include peer-reviewed, open-access studies evaluating adult post-infarction populations subjected to early physical therapy interventions, with a mandatory requirement that health-related quality of life (HRQoL) was assessed as a primary or secondary endpoint using validated clinical metrics (Limonti et al., 2025; Schon et al., 2024). Conversely, exclusion boundaries were applied to eliminate any publications lacking standardized quality of life instruments, those evaluating late-stage maintenance rehabilitation (Phase III or IV) exclusively without early intervention data, non-English manuscripts, and informal gray literature such as editorials, comments, or incomplete conference abstracts (Aleksova et al., 2025; Barczewska et al., 2025).

The literature identification protocol was executed systematically across electronic databases including PubMed, PubMed Central (PMC), and Google Scholar, utilizing structured Boolean search queries that combined terms representing early physical mobilization, acute myocardial infarction, and multidimensional quality of life endpoints (Anderson et al., 2016; Dibben et al., 2023; Limonti et al., 2025). Within the selected literature, health-related quality of life outcomes were evaluated using a dual-measurement design that combined disease-specific and generic health status scales. Specifically, the disease-specific MacNew Quality of Life Myocardial Infarction questionnaire was analyzed to evaluate cardiac-specific physical, emotional, and social well-being, while generic health instruments—including the Medical Outcomes Study 36-item Short Form Health Survey and the EuroQol 5-Dimensional scale—were evaluated to capture broader functional health summaries and self-rated health status (Bäck et al., 2025; Hisam et al., 2022; Limonti et al., 2025).

A qualitative extraction protocol was utilized to compile, tabulate, and qualitatively synthesize patient characteristics, intervention settings, and domain-specific quality of life outcomes from a finalized pool of approximately 30 peer-reviewed full-text publications (Barczewska et al., 2025; Limonti et al., 2025). Due to the narrative and qualitative nature of this review, no secondary quantitative meta-analytic pooling software or formal statistical modeling was utilized to aggregate numerical effect sizes across the cohorts (Barczewska et al., 2025). In accordance with modern transparent publishing standards, the authors declare that generative Artificial Intelligence (A.I.) applications were used exclusively as supportive writing and language-refining tools to enhance academic phrasing, syntax, and readability (Barczewska et al., 2025). No clinical analysis, data extraction, or evidence verification steps were delegated to automated systems; all primary conceptualization, literature screening, data validation, and final clinical conclusions were executed entirely and independently by the human authors (Barczewska et al., 2025).

3. Research results

3.1. Overview of Included Studies and Patient Demographics

The systematic synthesis of contemporary clinical literature reveals a structurally diverse but highly representative post-myocardial infarction (MI) patient population subjected to early physical rehabilitation. Across the analyzed cohorts, patient demographics consistently reflect

a mean age ranging from 52 to 67 years, a prominent representation of male participants (typically comprising 70% to 80% of the sample), and high rates of successful revascularization via percutaneous coronary intervention (PCI) (Bäck et al., 2025; Hisam et al., 2022; Tsai et al., 2019). The research designs evaluated encompass multi-center prospective registries, randomized controlled trials (RCTs), and large-scale meta-analyses (Aleksova et al., 2025; Dibben et al., 2021; Limonti et al., 2025). For instance, the Swedish SWEDEHEART-CR registry utilized a cohort of 232 post-MI patients to demonstrate the real-world feasibility of remote exercise-based cardiac rehabilitation (EBCR) (Bäck et al., 2025). Similarly, landmark trials such as the Yoga-CaRe study in India (n=3,959) and the MCard trial in Pakistan (n=160) have explored low-cost and mobile health (mHealth) paradigms, demonstrating robust clinical generalizability across varying socioeconomic settings (Hisam et al., 2022; Prabhakaran et al., 2020). However, comprehensive meta-analyses indicate that global rehabilitation participation remains low, averaging approximately 34% in patients with acute MI (Wang et al., 2023). Programmatic enrollment and completion are strongly influenced by demographic and clinical factors, with older age, female sex, lower education level, and comorbidities predicting lower participation, whereas acute ST-segment elevation myocardial infarction (STEMI) and higher economic levels significantly increase referral and adherence rates (Wang et al., 2023; Du et al., 2020). To contextualize the primary evidence base, Table 1 synthesizes the baseline demographics, rehabilitation phases, measurement instruments, and key qualitative findings of the representative studies.

Table 1: Overview of Selected Primary Studies and Patient Cohorts

Study / Author & Year	Sample Size (n)	Intervention / Phase	Primary HRQoL Tool	Key Findings
Bäck et al., 2025	232	Phase II remote exercise-based cardiac rehabilitation (video group twice/week for 3 months)	EQ-VAS scale and Tampa Scale for Kinesiophobia Heart (TSK-Heart)	Confirmed real-world safety with zero exercise-related serious adverse events; 67.2% completed ≥75% of sessions with significant physical capacity and kinesiophobia improvements.
Hisam et al., 2022	160	Phase II mobile health augmented cardiac rehabilitation (MCard; SMS, home monitoring devices)	Generic SF-12 and disease-specific MacNew QLMI	Documented statistically significant physical and mental HRQoL improvements at 12 and 24 weeks compared to standard care.
Tsai et al., 2019	70	Early Phase II outpatient CR (starting 5–7 days post-STEMI; 3 sessions/week for 50 min)	SF-36 Health Survey (Chinese-Taiwan version)	Reported significant improvements in the mental component summary (MCS) at 6 months; established safety with no training-related adverse events.
Antonakoudis	110	Phase II	Velasco-Del	Documented significantly

et al., 2006		multidisciplinary supervised exercise (bike training 3x/week for 2 months)	Barrio QoL Questionnaire	better overall QoL scores and superior outcomes in symptoms and social behavior compared to controls.
Prabhakaran et al., 2020	3,959	Phase II Yoga-based cardiac rehabilitation (Yoga-CaRe) vs. standard care	EQ-5D-5L Scale and Visual Analogue Scale (EQ-VAS)	Demonstrated significantly enhanced self-rated health on the EQ-VAS at 12 weeks and accelerated the return to pre-infarction daily activities.
Du et al., 2020	326	Phase II CR and occupational recovery tracking post-MI	Short-Form Health Survey-8 (SF-8)	Determined that active participation in and completion of structured CR programs are primary independent positive predictors of post-MI quality of life.

3.2. Impact of Early Physical Rehabilitation on HRQoL Domains

Early physical rehabilitation systematically enhances the multidimensional domains of health-related quality of life, yielding positive outcomes across physical, psychological, and social recovery pathways (Hisam et al., 2022; Limonti et al., 2025). Within the physical functioning domain, patient-reported outcome measures (PROMs) consistently demonstrate that progressive mobilization counters functional decline and expands overall aerobic capacity, as evidenced by marked increases in generic physical component summary (PCS) scores (Hisam et al., 2022; Limonti et al., 2025). This physiological restoration directly correlates with clinically significant gains in exercise tolerance, represented by improvements in six-minute walk test (6MWT) distance and peak oxygen consumption (VO2 max) (Limonti et al., 2025). Concurrently, the psychological domain benefits from early physical activity, which acts as a powerful therapeutic tool to alleviate post-infarction depression and generalized anxiety (Bäck et al., 2025; Limonti et al., 2025). Specifically, structured progression of exercise sessions significantly reduces kinesiophobia (the debilitating fear of movement), as measured by a substantial drop in the Tampa Scale for Kinesiophobia Heart (TSK-Heart) scores, thereby building patient self-efficacy and confidence to engage in daily physical activities (Bäck et al., 2025).

Furthermore, the social domain exhibits parallel improvements, highlighted by superior daily functioning, smoother vocational reintegration, and enhanced peer-to-peer interaction (Antonakoudis et al., 2006; Bäck et al., 2025; Du et al., 2020). Disease-specific measurement instruments, such as the MacNew Quality of Life Myocardial Infarction (QLMI) questionnaire and the Velasco-Del Barrio scale, confirm that early rehabilitated cohorts report fewer cardiovascular symptoms, diminished feelings of isolation, and superior scores in social behavior compared to standard care or delayed intervention groups (Antonakoudis et al., 2006; Hisam et al., 2022). To summarize these multi-domain clinical outcomes, Table 2 maps the pre- and post-intervention score improvements recorded across validated generic and disease-specific quality of life instruments.

Table 2: Pre- vs. Post-Intervention Quality of Life Metrics Across HRQoL Domains

Domain / Instrument	Pre-Intervention Level	Post-Intervention Level	Clinical Significance
Physical Component Summary (SF-12 PCS)	Mean: 39.80 points (95% CI: 38.51, 41.09) (Hisam et al., 2022)	12 weeks: 48.96 points 24 weeks: 53.62 points (95% CI: 52.73, 54.52)	$p<0.001$; reflects significant, progressive gains in physical functioning and aerobic capacity compared to control decline.
Mental Component Summary (SF-12 MCS)	Mean: 43.36 points (95% CI: 41.99, 44.73) (Hisam et al., 2022)	12 weeks: 44.84 points 24 weeks: 48.95 points (95% CI: 47.42, 50.49)	$p<0.001$; indicates a substantial, sustained reduction in psychological distress, post-MI anxiety, and depression.
Disease-Specific Index (MacNew QLMI Global)	Mean: 3.87 points (95% CI: 3.81, 3.93) (Hisam et al., 2022)	12 weeks: 4.49 points 24 weeks: 4.96 points (95% CI: 4.76, 5.16)	$p<0.001$; represents comprehensive improvements across cardiac-specific physical, emotional, and social wellness.
Self-Rated Health State (EQ-VAS Scale)	Mean: 65.5 points (Prabhakaran et al., 2020)	12 weeks: 77.0 points	Regression coefficient: 1.5 (95% CI: 0.5–2.5, $p=0.002$); demonstrates superior self-perceived health and daily role recovery.
Multi-Domain QoL Score (Velasco-Del Barrio)	Mean: 114±3 points (standard care/control cohort) (Antonakoudis et al., 2006)	2 months: 94±4 points (active CR cohort)	$p<0.01$; lower score indicates superior quality of life, driven by improvements in symptoms (17±6.8 vs. 22±6.5) and social behavior (21±4.2 vs. 23±5.5).

3.3. Phase I vs. Phase II Intervention Outcomes

Comparing the clinical outcomes of short-term in-hospital mobilization (Phase I) with early outpatient or home-based rehabilitation programs (Phase II) underscores the complementary yet distinct therapeutic mechanisms of each stage. Phase I cardiac rehabilitation, initiated within 48 to 72 hours of hemodynamic stabilization post-PCI, primarily targets the mitigation of acute bed rest complications (Aleksova et al., 2025; Nakamura et al., 2021; Susca et al., 2020). Early Phase I mobilization is highly safe, and clinical data demonstrate its efficacy in preventing adverse left ventricular remodeling, preserving myocardial systolic function, and reducing systemic inflammatory mediators (such as high-sensitivity C-reactive protein and matrix metalloproteinases) (Cai et al., 2021; Susca et al., 2020). Economically and logistically, early Phase I initiation is strongly correlated with a shortened acute hospital stay and lower overall healthcare costs, without increasing the incidence of major adverse cardiovascular events (MACE) or arrhythmias (Nakamura et al., 2021).

Conversely, early Phase II cardiac rehabilitation, commencing immediately or within 5 to 7 days post-discharge, focuses on the consolidation of these early functional reserves through structured, progressive aerobic and resistance training (Aleksova et al., 2025; Tsai et al., 2019). Phase II programs that leverage home-based telerehabilitation, wearable smart bands, and smartphone interactive platforms consistently achieve higher long-term adherence rates—

frequently exceeding 80%—by overcoming geographic and transport barriers (Limonti et al., 2025). The clinical literature indicates that exercise intensity (calibrated to 40%–85% of heart rate reserve or light-to-moderate Borg RPE scales) and early initiation timelines are positive predictors of long-term functional recovery (Kim et al., 2015; Tsai et al., 2019). Delaying the initiation of Phase II exercise training, or failing to transition successfully from Phase I to Phase II, is associated with a rapid decline in physical fitness, persistent kinesiophobia, higher rates of psychiatric comorbidities, and a 40% higher risk of cardiovascular-related hospital re-admissions (Du et al., 2020; Limonti et al., 2025). Consequently, a seamless progression from early acute Phase I mobilization to structured Phase II home-based or center-based programs is essential for establishing a durable, upward trajectory in post-MI health-related quality of life (Aleksova et al., 2025; Bäck et al., 2025).

4. Discussion

The clinical implementation of early physical rehabilitation following acute myocardial infarction serves as a powerful therapeutic strategy that counters the profound physiological and psychological deconditioning triggered by prolonged bed rest (Aleksova et al., 2025; Susca et al., 2020). Historically, post-infarction care mandated strict, extended recumbency to prevent arrhythmic or mechanical complications, but modern clinical trials and real-world registries demonstrate that immobilization rapidly induces skeletal muscle deconditioning, joint contractures, and systemic inflammatory activation (Aleksova et al., 2025; Susca et al., 2020). Early progressive mobilization—initiated during Phase I hospitalization and continued into Phase II outpatient or home-based training—drives cardiopulmonary adaptation by expanding peak oxygen consumption, elevating the anaerobic threshold, and optimizing ventilatory efficiency (Cai et al., 2021; Limonti et al., 2025). At the myocardial level, early structured exercise prevents deleterious left ventricular remodeling and preserves left ventricular ejection fraction, which is biochemically mediated by a reduction in circulating inflammatory markers and matrix metalloproteinases, specifically matrix metallopeptidase 9 and tissue inhibitor of metalloproteinases 1 (Cai M et al., 2021; Susca et al., 2020). Furthermore, early physical training optimizes endothelial function and vascular hemodynamics, reducing carotid arterial stiffness by lowering the beta-stiffness index, Peterson's elastic modulus, and pulse wave velocity (Ołpińska et al., 2024; Pedersen & Saltin, 2015). These central and peripheral adaptations are supported by a marked improvement in autonomic regulation, characterized by increased heart rate variability and accelerated end-exercise heart rate recovery, which collectively minimize the risk of recurrent adverse cardiovascular events and enhance overall functional capacity (Schon et al., 2024; Nakamura et al., 2021; Cai et al., 2021).

These physiological improvements directly translate into substantial enhancements across the psychological and social domains of health-related quality of life. The acute trauma of a myocardial infarction frequently precipitates severe psychological distress, presenting as post-infarction anxiety, clinical depression, and a disabling fear of movement, known as kinesiophobia, which diminishes the patient's self-efficacy and limits physical independence (Bäck et al., 2025; Du et al., 2020; Limonti et al., 2025). Structured early rehabilitation acts as an effective psychotherapeutic countermeasure, significantly lowering kinesiophobia scores on the Tampa Scale for Kinesiophobia Heart by demonstrating to patients that physiological cardiovascular responses, such as sweating and elevated heart rates, are safe and therapeutic consequences of exercise rather than precursors to a recurrent coronary event (Bäck et al., 2025; Pedersen & Saltin, 2015). This cognitive reframing restores patient self-confidence, alleviates depression, and enhances general emotional well-being (Bäck et al., 2025; Limonti et al., 2025). Consequently, the restoration of physical stamina and psychological confidence

facilitates rapid social reintegration, allowing patients to successfully return to pre-infarction daily activities, regain daily functional roles, and successfully return to work without prolonged absence, thereby maximizing long-term health-related quality of life (Prabhakaran et al., 2020; Du et al., 2020).

These findings carry significant implications for contemporary clinical cardiology and sports medicine, particularly concerning the timing, intensity, and safety of exercise-based secondary prevention. While the therapeutic advantages of mobilization are undisputed, clinical guidelines exhibit geographic and organizational disparities regarding program initiation. The European Society of Cardiology Guidelines advocate for starting Phase I cardiac rehabilitation as early as possible—ideally within forty-eight to seventy-two hours of hemodynamic stabilization post-percutaneous coronary intervention—demonstrating that early mobilization reduces the acute hospital stay, lowers healthcare expenditures, and improves subsequent treatment adherence and survival (Aleksova et al., 2025; Nakamura et al., 2021). Conversely, the American College of Cardiology Guidelines suggest starting Phase II rehabilitation within one to two weeks of hospital discharge, while older, more conservative practices often delayed exercise for three to four weeks due to concerns over hemodynamic stability (Aleksova et al., 2025). Progression of training intensity remains a vital clinical parameter; Phase I relies on highly controlled, light-intensity activities, typically limited to two to three metabolic equivalents or a Borg perceived exertion scale of nine to twelve (Schon et al., 2024). During Phase II, exercises transition to moderate-to-vigorous intensities, with high-intensity interval training emerging as a safe and exceptionally time-efficient intervention that yields superior improvements in cardiorespiratory fitness and endothelial function compared to moderate-intensity continuous training (Barczewska et al., 2025; Limonti et al., 2025). Crucially, across all examined exercise intensities and modalities, early physical rehabilitation demonstrates an outstanding safety profile with zero exercise-related serious adverse events, confirming that early post-MI physical activity is highly secure when preceded by appropriate clinical screening (Bäck et al., 2025; Tsai et al., 2019).

To properly contextualize these outcomes, the inherent strengths and limitations of the compiled literature must be critically evaluated. A primary strength of this narrative review is the synthesis of high-level evidence, integrating findings from multi-center randomized controlled trials, large-scale systematic reviews, and extensive national quality registries, such as the Swedish SWEDEHEART-CR registry, which enhances the clinical generalizability of the findings (Bäck et al., 2025; Limonti et al., 2025). However, several limitations must be addressed. First, because this paper is designed as a qualitative narrative review, it lacks a quantitative meta-analytic pooling of effect sizes, which prevents a direct numerical comparison of specific protocol efficacies. Second, substantial heterogeneity exists across studies regarding exercise duration, frequency, and intensity, alongside varying intervention modalities that range from traditional center-based programs to diverse home-based telerehabilitation and mobile health platforms (Limonti et al., 2025). Third, the evaluation of health-related quality of life relies heavily on subjective, patient-reported outcome measures (e.g., SF-36, EQ-5D, and MacNew QLMI), which are susceptible to individual shifts in illness perception and reporting bias (Aleksova et al., 2025; Limonti et al., 2025). Furthermore, a notable geographic bias is present within the digital health literature, where approximately three-quarters of randomized trials evaluating smartphone- and home-based telerehabilitation were conducted in China, potentially limiting external validity in Western nations with differing healthcare structures (Limonti et al., 2025). Finally, a paucity of long-term follow-up data beyond twelve months makes it difficult to assess the permanent durability of these functional and psychological improvements (Limonti et al., 2025).

To address these limitations, future research must establish clear, actionable priorities aimed at standardizing and refining post-MI rehabilitation strategies. Clinical investigators should focus on designing universally adaptable, structured home-based and hybrid telerehabilitation protocols accompanied by rigorous cost-effectiveness analyses (Limonti et al., 2025). Given that global cardiac rehabilitation participation remains low at approximately thirty-four percent, future trials must prioritize identifying and mitigating patient-level barriers to enrollment and completion, with a particular emphasis on age- and gender-specific adaptations (Wang et al., 2023; Aleksova et al., 2025). Women, in particular, face unique obstacles, including older age, higher comorbidity rates, family and domestic responsibilities, lower clinical referral rates, and lack of social encouragement (Aleksova et al., 2025; Wang et al., 2023). Consequently, future research must evaluate tailored, flexible intervention models—such as home-based telerehabilitation or smartphone-supported counseling—specifically designed to overcome these female-specific barriers (Aleksova et al., 2025). Additionally, digital telerehabilitation models must incorporate targeted, user-friendly educational components to overcome low digital literacy among elderly patients and minimize digital exclusion (Limonti et al., 2025). Lastly, future trials should transition beyond purely subjective quality-of-life questionnaires by systematically integrating objective, multi-system clinical endpoints. Research designs should combine cardiac magnetic resonance imaging to monitor left ventricular geometry, cardiopulmonary exercise testing to assess functional capacity, and heart rate variability monitoring to evaluate autonomic restoration (Schon et al., 2024). These clinical evaluations should be paired with the tracking of circulating biochemical and inflammatory markers, such as high-sensitivity C-reactive protein, interleukin-6, and matrix metalloproteinases, to establish a highly objective, multi-dimensional, and comprehensive understanding of early post-infarction physical recovery (Susca et al., 2020; Nakamura et al., 2021; Limonti et al., 2025).

5. Conclusions

The synthesized empirical evidence compiled in this narrative review establishes early exercise-based physical rehabilitation as a safe, highly effective, and fundamentally prognosis-modifying therapy for patients recovering from acute myocardial infarction (Aleksova et al., 2025; Dibben et al., 2023). Moving away from traditional, prolonged recumbency, immediate post-ischemic mobilization significantly enhances health-related quality of life (HRQoL) across its physical, emotional, and social dimensions (Prabhakaran et al., 2020; Hisam et al., 2022). These clinical improvements are driven by central physiological adaptations, including the prevention of adverse left ventricular remodeling, optimization of autonomic regulation, and reduction of systemic inflammatory markers (Cai et al., 2021; Susca et al., 2020). Beyond restoring cardiovascular reserves, structured early mobilization directly targets psychological barriers, significantly reducing post-infarction kinesiophobia and anxiety, which subsequently restores daily functional autonomy, patient self-efficacy, and successful return to work (Bäck et al., 2025; Du et al., 2020).

A seamless clinical synergy exists between early acute in-hospital mobilization (Phase I) and subsequent outpatient or home-based cardiac rehabilitation (Phase II) (Aleksova et al., 2025). Initiating light physical activity within forty-eight to seventy-two hours of hemodynamic stabilization successfully prevents recumbency-induced deconditioning, accelerates clinical stability, and reduces the duration and cost of hospitalization (Nakamura et al., 2021; Susca et al., 2020). This acute phase establishes a vital functional foundation for Phase II programs, which capitalize on these early gains through progressive aerobic and resistance training (Schon et al., 2024; Tsai et al., 2019). Modern home-based telerehabilitation models, supported by interactive mobile health applications and wearable devices, facilitate this

transition, achieving high clinical adherence, decreasing the risk of therapy discontinuation, and reducing secondary hospital readmission rates by up to forty percent (Limonti et al., 2025). Conversely, delayed enrollment beyond thirty days post-discharge significantly impairs metabolic recovery, highlights persistent kinesiophobia, and leads to poorer functional outcomes, highlighting the need for immediate, coordinated transition pathways (Aleksova et al., 2025; Johnson et al., 2014).

Based on these rigorous insights, clinical cardiology and sports medicine specialists must collaborate to establish standardized clinical pathways that mandate early, protocol-guided Phase I mobilization as standard post-revascularization care (Aleksova et al., 2025). To facilitate patient-centered secondary prevention, clinical teams should systematically integrate validated multi-domain HRQoL measurement tools—specifically the disease-specific MacNew questionnaire, alongside generic SF-36 and EQ-5D scales—into routine outpatient surveillance to track physical and mental recovery trajectories (Hisam et al., 2022; Dibben et al., 2023). Finally, to optimize long-term adherence and address global underutilization, healthcare systems should widely implement flexible, hybrid, and digital home-based telerehabilitation platforms, ensuring customized secondary prevention is accessible to historically underserved patient demographics, including elderly and female cohorts (Aleksova et al., 2025; Limonti et al., 2025; Wang et al., 2023).

Disclosure

Supplementary Materials

Not applicable

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All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors deny any conflict of interest

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