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Integrated care for chronic musculoskeletal (MSK) disorders is promising but incomplete: a scoping review of MSK service delivery approaches across systems

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Systematic Review

Keywords: Integrated care, Musculoskeletal disorders, Care pathway, Collaboration, Continuity of care

Posted Date: August 19th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8444965/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Care for people with chronic musculoskeletal (MSK) disorders is often fragmented and siloed, which limits access to appropriate and timely services. Integrated care (IC) is an emerging approach that promotes person-centred management of chronic conditions, but its application to MSK disorders is insufficiently explored.

Objective

This scoping review synthesizes how integrated care is conceptualized, delivered, and evaluated for people with chronic MSK conditions.

Methods

This scoping review is guided by the JBI methodology. A comprehensive search was conducted in Ovid MEDLINE, CINAHL, EMBASE, PsycINFO, and gray literature sources. Five reviewers independently screened abstracts and full texts, and data extraction was facilitated using a standardized checklist in Covidence software.

Results

7,086 papers were identified, of which 97 met the inclusion criteria. An inductive thematic analysis approach was used to operationalize IC across the studies. IC was operationalized differently based on intervention goals, with six key themes emerging: (1) a collaborative and multidisciplinary team-based approach, (2) coordinated care pathways for streamed service delivery, (3) biopsychosocial and complementary health integration into MSK care, (4) technology-enabled and digital integration of services, (5) occupational and workplace service integration, and (6) value-based and accountable care integration. The care process discussed in the papers primarily focused on delivering patient-centred care, but only 5% addressing family and caregiver involvement. The healthcare providers most frequently involved were family physicians/general practitioners and physiotherapists (both 67%), followed by specialist doctors (60.8%). Care coordinators/navigators (17.5%) and social care providers (12.4%) were less frequently represented in the care process. MSK services involved both horizontal and vertical integration within healthcare teams; however, evidence of comprehensive, whole-system integration across sectors remains limited. Outcomes were reported across different domains, with patient-level health outcomes most assessed. Studies also examined patient experience, care delivery process and coordination, health service use, economic outcomes, and implementation-related outcomes.

Conclusion

IC for chronic MSK conditions is conceptualized and implemented with considerable variability. Greater emphasis on whole-system integration, community partnerships, and caregiver involvement is needed to enhance care delivery and improve outcomes. Consideration should also be given to adopting a comprehensive evaluation of integrated services, looking at the broader impact on systems.

Clinical Trial Number

: Not applicable.

Introduction

Chronic musculoskeletal (MSK) disorders (lasting ≥ 3 months), such as low back pain, osteoarthritis, and rheumatoid arthritis, are among the leading causes of disability worldwide [1,2]. These conditions impose a significant burden on affected people, healthcare and social services, and on economies through lost productivity and early retirement [3–5]. The global burden of MSK disorders is expected to rise in the coming decades [6]. A concerted local and global response and actions, ranging from health promotion to prevention to management and rehabilitation, have been endorsed as necessary to overcome the growing burden [7].

Managing chronic MSK disorders often requires long-term, multifaceted strategies that address the health and social care needs of people with these conditions [8,9]. Ideally, chronic MSK care should target not only physical symptoms such as pain but also the broader and complex psychological and social needs [10–12]. However, many people lack access to comprehensive, multimodal approaches that meet their care needs [13,14].

Often, people with chronic MSK disorders face fragmented services, siloed across providers, with long wait times to access appropriate services [15]. These issues increase the gap between the health and social care needs of people with these conditions and the service delivery process, leaving many without timely appropriate care [16]. These delays further exacerbate the pain and disability cycle among people with these conditions. The complex nature of chronic MSK disorders requires a care model that goes beyond the current siloed healthcare delivery model [8,9,15,17].

Integrated care (IC) is a promising approach to overcoming siloed and fragmented service delivery with a focus on person-centred care for people with chronic health conditions [18,19]. This model emphasizes coordinated, interdisciplinary interventions to improve patients' health outcomes and experiences,

and to optimize resource utilization [20,21]. Overall, IC involves well-designed collaborations between various healthcare providers and services to deliver comprehensive care centred on the needs and goals of people with health conditions [17,22].

While IC has been effectively used in managing other chronic health conditions, its application in the context of chronic MSK disorders is less explored. There is also a significant gap related to how IC is conceptualized, delivered, and assessed for people with MSK disorders [23]. As a result, the evidence supporting the use of IC for chronic MSK disorders remains limited. Understanding the attributes, components, goals, and outcomes associated with IC will inform practices and policies that support improved service delivery. Integrated care can also help to create a common language among stakeholders, including healthcare administrators, providers, and people with the lived experience of accessing MSK services across systems.

This scoping review aimed to synthesize evidence from existing papers to evaluate how IC is conceptualized for adults with chronic MSK disorders, including the identification of the attributes, components, goals, and outcomes used to evaluate IC for chronic MSK disorders. Additionally, the review aimed to understand the theoretical frameworks and the facilitators and barriers to implementing and evaluating this model of care for people with chronic MSK disorders. Although a protocol was published, we restate the review questions to enhance transparency and reflect the final analytic approach used in the completed review. The review questions were:

- How is integrated care conceptualized in the management of adults with chronic MSK disorders?
- What are the goals of existing integrated care interventions for adults with chronic MSK disorders (e.g., outcomes evaluated)?
- Which health and social care professionals have been involved in the delivery of integrated care for adults with chronic MSK disorders?
- In what settings has an integrated care approach for adults with chronic MSK disorders been delivered?
- What are the reported facilitators and barriers to implementing integrated care for adults with chronic MSK disorders?
- What underlying theories or frameworks guide the delivery of integrated care for adults with chronic MSK disorders?
- To what extent do the reported elements, components, or attributes of integrated care interventions align with the elements of existing integrated care frameworks?

By mapping the existing evidence, this scoping review will inform future IC practice, research, and policy in the management of chronic MSK disorders across healthcare systems.

Methods

This scoping review was conducted according to the methodological framework proposed by the Joanna Briggs Institute (JBI) [24]. The protocol for this project, including the methods and specific research questions that guided this research, was published in the JBI Evidence Synthesis Journal [25]. The review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) framework/ guidelines [26].

Data sources and search strategy

A comprehensive search strategy was developed in consultation with a librarian experienced in systematic search methods and piloted iteratively to balance sensitivity and feasibility. An electronic search was conducted in major databases MEDLINE (Ovid), EMBASE (Ovid), CINAHL (EBSCO), Scopus, and the Cochrane Library using a combination of keywords related to “integrated care,” “coordinated care,” multidisciplinary care,” and “musculoskeletal disorders” and Medical Subject Headings (MeSH) tailored to each database. No limits were applied to the language or study design. The full search strategy is available in the published protocol [25]. Additional advanced searches were conducted in Google Scholar (as a supplementary source) and Google for grey literature using advanced search techniques. The Google search aimed to capture both peer-reviewed and non-peer-reviewed sources. The initial search was conducted on November 27, 2023, and the final update of the retrieved studies was conducted on November 14, 2025. The initial search strategy developed for Ovid MEDLINE is reported in the published protocol [25], while the search strategies adapted for other databases are provided in the Supplementary File 1 appended to this study.

The eligibility criteria for this review were guided by the PCC (Population, Concept, Context) framework [25]. The study included papers describing IC for adults (age ≥ 18 years) with major chronic MSK disorders. The population was defined conceptually to encompass people with major MSK conditions who share comparable long-term health and care needs, rather than intending to represent an exhaustive diagnostic list. Illustrative examples of MSK conditions in the study included rheumatoid arthritis, osteoporosis, osteoarthritis, lower back and neck pain, gout, and other MSK disorders (e.g., hip and knee pain) [1].

The search terms (e.g., MeSH terms) and keywords related to integrated care models (including integrated care, care coordination, collaborative care, care pathways, and value-based care) with terms capturing chronic MSK disorders and pain. In addition to named MSK diagnoses (e.g., low back pain, osteoarthritis, inflammatory arthritis, fibromyalgia), the search incorporated umbrella MSK and pain concepts (e.g., Musculoskeletal Diseases, Musculoskeletal Pain, Pain, Arthralgia), with MeSH terms exploded where appropriate to ensure broad coverage of MSK conditions that may not be consistently labelled or indexed across databases. Additionally, papers that addressed key attributes of IC, such as continuous/continuum of care, coordinated care, multidisciplinary/interdisciplinary team approach to care, case management, medication reviews, remote care delivery, and preventive health management strategies, were also included. We excluded papers or studies that focused solely or predominantly on acute MSK conditions, reported single-discipline interventions, or non-integrated care approaches.

Study selection

The lead author, in collaboration with a librarian, independently conducted the search and identified the titles and abstracts. All identified records were uploaded to Covidence (Veritas Health Innovation, Melbourne, Australia) for review, selection, and removal of duplicate citations. Five reviewers (MBC, SDW, GP, ND, and AA) screened titles and abstracts for eligibility, followed by full-text reviews. Following piloting, title, abstract, and full-text screening were conducted independently by two reviewers in Covidence using predefined eligibility criteria. Before formal screening, the reviewers conducted a pilot exercise in which 10 titles and abstracts were independently screened to ensure consistency and a shared understanding of the inclusion and exclusion criteria. Any disagreements among the reviewers at the title and abstract or full-text review stages were resolved through discussion. A third reviewer was not needed to resolve conflicts or for consultation. The overall study selection process and reasons for exclusion at the full-text level are presented in the PRISMA flow diagram (Fig. 1). A detailed list of excluded lists of full-text studies and reasons for exclusion is provided in Supplementary File 2.

Data extraction and analysis

Data extraction was conducted in Covidence (Veritas Health Innovation, Melbourne, Australia), an online systematic review management platform, between November 2023 and November 2025. A structured and standardized data extraction form was developed in Covidence, aligned with the review objectives and questions. To ensure reliability and clarity of the form, two reviewers (MBC and SDW) independently pilot-tested the Covidence data extraction form on 10% of the included papers. The extraction form was iteratively refined based on the information gathered during the review process. MBC subsequently completed data extraction for the remaining papers, with regular consultation and discussion with the broader team to resolve uncertainties and ensure consistent interpretation of the extracted data.

Following completion of data extraction in Covidence, all extracted data were exported to Microsoft Excel for data cleaning, descriptive summaries, and qualitative coding and synthesis. Data synthesis followed a combination of descriptive, inductive, and deductive approaches aligned with review questions. Descriptive summaries (e.g., counts/percentages) were generated to describe study characteristics. Inductive thematic analysis synthesized how authors conceptualized and operationalized integrated care for MSK conditions. Text segments describing “conceptualization” or “operationalization” of the included studies were coded in Microsoft Excel using an open coding approach. Codes were iteratively grouped into categories and synthesized into themes. No pre-existing framework was applied; themes that reflect how IC was operationalized were derived inductively from the data.

In addition to this inductive synthesis, we applied a deductive analytic step to examine the extent to which the identified components of IC services and interventions for chronic musculoskeletal conditions aligned with two established integrated care frameworks (Singer et al. (2011) and the Nine Pillars of Integrated Care) [27,28]. Brief descriptions of the frameworks and their components are provided in the Supplementary File 3. Furthermore, we have identified and analyzed types and degrees of service integration, reflecting where in the care process services were integrated and the degree of structural and functional linkage between services for chronic MSK conditions [29,30].

We use the term “degree of integration” to describe the strength of inter-service relationships, ranging from linkage (basic referrals), coordination (structured alignment through shared protocols or case management), collaboration (shared goals and joint planning across teams), to full integration (unified governance, funding, and service delivery). Type of integration refers to where integration occurred across the system (e.g., horizontal, vertical, sectoral, whole-system integration). Coding rules were applied consistently across studies, as reported in the service descriptions. Coding was conducted collaboratively by MBC and SDW, with regular meetings and discussions to refine synthesis and ensure rigor and alignment between themes and review questions.

Deviation from the protocol

A few pragmatic refinements were made during the review to enhance feasibility while remaining consistent with the intent stated in the protocol. Although several databases were identified, not all originally planned databases (e.g., PEDro, the JBI Evidence-Based Practice Database, and Web of Science were searched due to substantial overlap in indexed content and feasibility considerations. The approach to grey literature searching was implemented as outlined in the protocol, whereby the scope and volume of gray sources were guided by the breadth of evidence identified in the primary databases. In addition, books, book chapters, and conference abstracts were excluded at the full-text stage due to insufficient methodological details to support consistent data extraction. Finally, while independent data extraction was initially planned, this stage was modified in which two reviewers piloted the process, and a single reviewer completed the extraction with ongoing team discussion and verification. These refinements are not expected to alter the overall process and conclusions of the review.

Results

Overview

The search strategy identified 7,086 records from various databases, including 108 articles from Google Scholar and 79 articles from grey literature sources, which were screened for inclusion. Ninety-seven papers were included in the final synthesis. See Fig. 1 for a Prisma flow chart.

[Insert Fig. 1 approximately here]

Characteristics of included papers

A summary of the characteristics of the papers included in the final review is provided in Supplementary File 4. Most of the papers included in the final review originated from North America (the USA: n = 43 (43.9%); Canada: n = 9 (9.2%)) and European countries (n = 35 (35.7%)). No papers on the topic were identified from Africa, the Middle East, or Latin America. The included papers employed various methodologies, with the majority reporting observational (non-interventional) studies, including medical chart reviews, surveys/cross-sectional designs, prospective observational studies, case reports, and retrospective cohort studies.

Participant characteristics were inconsistently reported across studies. Where available, sample sizes ranged from single-case reports to observational datasets involving over 35,000 participants. Reported ages ranged from 19 to 94 years, and studies that reported sex/gender often included a higher proportion of female participants. The reviewed papers reported a wide range of musculoskeletal disorders affecting different parts of the body. Low back pain, with or without sciatica, is the most frequently reported condition (n = 48), followed by arthritic conditions (RA, OA, Gout) (n = 31), general musculoskeletal disorders (n = 21), and fibromyalgia (n = 11). Other non-spinal, non-arthritic joint pain, including issues in the knee, hip, pelvis, shoulder, and temporomandibular joint (TMD) were also reported (n = 18). This distribution underscores the complex and overlapping nature of MSK conditions, particularly in terms of the body areas involved.

Conceptualization of integrated care

Integrated care for MSK disorders was defined or conceptualized differently across the reviewed papers. Conceptualization of IC for chronic MSK conditions was based on its key components as well as the goals or aims of the care provided. The definitions or conceptualizations used in the papers were organized into six major themes. These include *a collaborative and multidisciplinary team-based approach to care; a coordinated care pathway for streamlined service delivery; a biopsychosocial and complementary health integration into MSK care; technology-enabled digital service integration; occupational and workplace service integration;* and *a value-based and accountable care organization.*

A complete list of these themes and their descriptions is summarized in Table 1 below.

[Insert Table 1 approximately here]

Table 1
Operational definitions, as well as the nature and description of the MSK care programs reported

Operational definition of MSK integrated care (themes) and description	Description	Citations
Theme1: A collaborative and multidisciplinary team-based approach	IC is conceptualized as a multidisciplinary and collaborative approach that involves various healthcare providers from different disciplines working together in a team-based approach to provide comprehensive care for people with musculoskeletal conditions	[12,31–63]
Theme 2: Coordinated care pathway for streamlined service delivery	A few studies have operationalized IC as a pathway that streamlines and coordinates care across different levels of care.	[7,32,34,64–89]
Theme 3: Biopsychosocial and complementary health integration into MSK care	Several studies have discussed the use of multicomponent therapeutic modalities that take a person-centred, whole-health approach to addressing the unique healthcare needs of people with MSK, moving beyond physical (biological) health challenges. This is achieved by incorporating/ integrating biopsychosocial, self-management, rehabilitation, and complementary and integrative health approaches into the care process.	[42,56,90–107]
Theme 4: Technology-enabled digital integration of services	Integrated care has been conceptualized as a technology-enabled model of care that incorporates digital tools, such as telehealth, mobile apps, electronic medical records, and electronic-based decision support, to improve access to and coordination of care.	[31,108–115]
Theme 5: Occupational and workplace service integration	Integrated care is conceptualized from the standpoint of workplace and occupational interventions aimed at enhancing the functioning and facilitating the return to work for people with chronic MSK conditions.	[59,116–120]
Theme 6: Value-based and accountable care integration	Integrated care has been conceptualized from the perspective of services aimed at optimizing the cost-efficiency of healthcare through a value-based payment mechanism.	[33,121–125]

Key components of integrated care

The alignment of integrated care components across the included studies with the framework proposed by Singer et al. (2011) and the Nine Pillars of Integrated Care [27,28] is shown in Fig. 2, with full study-level mapping in Supplementary File 5.

Within the Singer et al. framework, the most frequently identified elements were coordinated care within the care team (n = 94; 96.9%), patient-centred care (n = 90; 92.8%), and shared responsibility (n = 72; 74.2%). Other elements included continuous proactive and responsive action between visits (n = 62; 63.9%), coordinated access across care teams (n = 59; 60.8%), continuous familiarity with patients over time (n = 52; 53.6%), coordinated care between care teams (n = 52; 53.6%), and coordinated care between teams and community resources (n = 16; 16.5%). Within the Nine Pillars of Integrated Care, the most frequently identified components were shared values and vision (n = 90; 92.8%), workforce capacity and capability (n = 83; 85.6%), system-wide governance and leadership (n = 68; 70.1%), people as partners in health and care (n = 72; 74.2%), and transparency of progress, results, and impact (n = 72; 74.2%). Digital solutions (n = 45; 46.4%) and population health needs and local context (n = 44; 45.4%) were identified less often, while aligned payment systems (n = 17; 17.5%) and resilient communities and new alliances (n = 13; 13.4%) were the least frequently identified pillars.

[Insert Fig. 2 approximately here]

Theoretical frameworks

Figure 3 summarizes the conceptual frameworks, models, and theories underpinning integrated care service delivery across included studies. The biopsychosocial model was the most frequently cited framework (n = 21)[12,33,35,43,49,57–59,72,85,87,107,119,121,125–131], often used alongside other theoretical models. Other commonly mentioned models and frameworks include the chronic care model and integrated care model (n = 14) [38,44,48,52,57,60,72,87,112,123,125–127,127,131], as well as behavioural and psychological approaches (n = 16) such as cognitive behavioural therapy, motivational interviewing, and acceptance and commitment therapy [35,52,60,62,63,87,90,102,107,120,121,123,124,128,132,132,133]. A few papers drew on implementation science and quality improvement frameworks (n = 12) [43,44,66,75,80,81,83,86,116,131,134,135], organizational, health policy, and system theories (n = 15) [58,67,82,91,92,94,102,108–110,113,114,122,125,131], and person-centered, ergonomic and work-related rehabilitation principles (n = 8) [34,35,82,105,117,118,120,124]. Thirty-eight papers did not report an explicit theoretical framework, representing approximately one-third of the included studies [17,31,32,36,37,39–41,45–47,50,53–56,64,65,68–70,73,74,76,79,83,84,88,89,93,98–100,104,106,111,115,136]. Detailed descriptions of specific frameworks are provided in Supplementary File 6.

[Insert Fig. 3 approximately here]

Types and degree of service integration

Horizontal integration is the most common form (n = 79, 81.4%), mainly involving coordination of care across services within a similar tier of the health system (e.g., interdisciplinary care within tertiary specialized care settings). In contrast, sectoral integration (n = 16, 16.5%), which connects healthcare with other sectors (e.g., housing) and whole-system integration (n = 5, 5.2%), which signifies a fully unified health and social system, are less common. Sectoral and whole-system integration indicate a truly integrated and mature healthcare system capable of addressing the multidimensional and complex needs faced by people with chronic MSK conditions. Additional information is available in Supplementary File 4.

With regards to the degree of integration, coordination is the most reported form of integration (n = 64, 66%), indicating a structured effort to align services through shared protocols, case management, or inter-service communication, without necessarily merging organizational operations. A few MSK services described in the papers also took the form of linkage, such as basic referrals and connections (n = 7, 7.2%). Collaboration (n = 20, 20.6%) – such as joint planning and shared goals, appears to be moderately represented. Full integration, which is the highest and advanced form of integration, involving unified governance, shared funding, and integrated service delivery, was less commonly reported in the papers (n = 7, 7.2%). Figure 4 shows the degree of service integration.

[Insert Fig. 4 approximately here]

Service delivery settings and approaches

The findings of the review indicate that care for people with chronic MSK conditions was provided across a wide variety of settings covering all levels of the health system. However, primary and community care emerged as the main setting, with over half of all cases managed in this setting (n = 58, 59.8%). These include standalone primary care (n = 19, 19.6%), as well as combinations with secondary (n = 9, 9.3%), tertiary and specialist care services (n = 18, 18.6%), community services (n = 9, 9.3%), and a combination of all four (n = 11, 11.3%). These findings highlight the essential role of primary care as the foundation for initiating and coordinating care within the integrated care pathways for people with chronic MSK conditions.

This review highlights that in-person integrated service delivery was reported in 47 (48.5%) studies, hybrid models in 38 (39.2%), and fully virtual delivery in three studies (3.1%) [54,113,134]. Supplementary File 4 provides detailed information related to integrated service delivery settings and approaches for people with chronic MSK conditions.

Health and social care involvement

The review highlights the involvement of various health and social care providers in delivering integrated care for chronic musculoskeletal (MSK) conditions. These include family physicians or general practitioners (n = 65, 67%), physiotherapists (n = 65, 67%), specialist physicians (n = 59, 60.8%), and mental health professionals such as psychiatrists, psychologists, and counsellors (n = 43, 44.3%). Others encompass complementary and integrative health practitioners (n = 35, 36%), occupational therapists (n = 26, 26.8%), nurses (n = 26, 26.8%), care coordinators and navigators (n = 17, 17.5%), chiropractors (n = 14, 17.5%), pharmacists (n = 13, 13.4%), and social workers (n = 12, 12.4%). A small number of papers also recognized the roles of healthcare administrators (n = 4, 4.1%) in delivering integrated care.

Caregiver partner involvement

Most papers reported direct engagement of people with chronic MSK conditions in their care process. However, caregiver partners and other formal or informal support networks, despite their recognized role in improving coordination, continuity of care, and holistic understanding of patients' needs, were notably limited. Only six papers [59,68,94,109,114,132], highlighted the central role of caregiver partners (n = 5) and workplace supervisors (n = 1) [59] as part of a broader support network in the care delivery process.

Outcomes evaluated and reported

Several studies discussed multiple outcomes spanning patient health, patient experience, care delivery, health service use, economic, and implementation-related outcomes. To organize the heterogeneity of reported outcomes, we used a pragmatic classification approach adapted from multiple established

frameworks [137–139].

Patient-level health outcomes were the most frequently reported domain (n = 58 papers), including pain, disability, physical function, and health-related quality of life [12,31–33,38,40,43,46,48,52–57,59,60,62–64,70,72,73,76,83,87,89,91,92,94,95,97,98,101–113,115,117,121,122,125,126,130,140–144]. Care delivery, process, and coordination outcomes were reported in 34 papers and included referral quality, triage efficiency, and access to treatment. Patient experience/ care experience outcomes were reported in 31papers [31,34,38,43,45,55,57,59,60,62,63,65,69,70,72,73,76,82,85,94,95,102,108,110,113,117,121,122,140,143,144] and included patient satisfaction, experience, engagement, and perceived usefulness of care. Health service and resource utilization outcomes (e.g., referral volume, hospital admissions, medication use, surgical conversion) were reported in 29 papers [37,38,43,44,46,52,65,67,70,73–76,79,81,85,86,91,92,95,98,99,104,106,109,115,122,125,144]. Economic outcomes (e.g., cost-effectiveness, financial productivity) were reported in 24 papers [38,44,48,56,57,62,73–76,85,89,104,109,110,112,115,117,118,120,122,124,125]. Implementation, provider, and organizational outcomes, such as feasibility, acceptability, adoption, fidelity, provider attitudes, and satisfaction, were reported in 20 papers [31,48,55,58,59,62,63,80,81,83,86,89,91,94,95,108,110,118,125,130]. Sixteen papers were categorized as reporting unclear, ambiguous, or not applicable outcomes [17,36,39,47,49,61,66,68,88,93,100,114,116,123,127,145].

Only one paper explicitly reported the Quintuple Aim as its guiding framework for outcome evaluation [94]. The Quintuple framework extends the Triple Aim by including provider well-being and health equity alongside population health, patient experience, and cost of care [139,146]. Details of reported outcomes are provided in Supplementary File 7.

Facilitators and barriers to integrated service delivery

Reported facilitators and barriers were analyzed in the subset of included studies that explicitly reported determinants influencing the implementation or delivery of integrated care for people with chronic MSK conditions. Determinants were coded inductively by two reviewers and then grouped into higher-order categories using the socio-ecological model encompassing intrapersonal, interpersonal, organizational, community/care network, and policy/ system levels [147,148]. Overall, 69 studies reported at least one facilitator or barrier to integrating MSK services. Because studies may report multiple facilitators and barriers, the frequency counts are not mutually exclusive.

Barriers to integrated MSK service delivery were reported most frequently at the organizational level challenges (n = 30) [7,31,32,34,36,41,51,58,66,70,73,75,80,83,91,93,94,97,98,100–102,104,110,117,121–123,126,145,149] followed by policy/ system (n = 21) [32,34,36,51,66,69,73,80,81,91,93–95,101,104,108,114,121,122,149,150] levels. Common organizational barriers include workflow and implementation challenges, time and workload pressures, resistance to change. At policy level, key barriers include broader health system misalignment, structural inequities, disruptions from concurrent reforms.

Facilitators were most commonly reported at the organizational level facilitators (n = 18) [31,32,46,52,61,63,66,72,79,81,86,91,97,101,109,115,123,135] followed by interpersonal levels (n = 15) [36,46,54,59,74,78,80,95,100,102,134,142,150]. Frequently identified facilitators included structured care protocols, collaboration, communication, provider training, structured care process, and supportive digital or governance mechanisms. Further details are presented in Table 2.

[Insert Table 2 approximately here]

Table 2
Barriers and facilitators to delivering integrated care for chronic MSK disorders

Type	Socio-ecological model categories	Examples	Number of studies
Barriers	Intrapersonal level (patient-level factors)	- Trust and co-management concerns (e.g., concerns that some providers do not support co-management of their conditions) [36,80,142] - Pre-existing beliefs, expectations, and motivation [74,78,95,100,134,150] - Preferences for individualized care [36,74] - Cultural and language adaptation issues [100] - Logistic and behavioral issues affecting attendance, adherence, and follow-up [36,46,54,59,78,95,102,142,150]	14
	Interpersonal level (provider-patient & interprofessional relationships)	- Communication and collaboration breakdown [45,66,82,151] - Differences in philosophies among different providers [45,93]	5
	Organizational level (service delivery and institutional context)	- Workflow issues [83,110] - Time constraints limiting consultation and coordination of tasks [80,123,126] - Structural and organizational barriers limiting service operation [58,126,149] - Administrative errors affecting follow-up [70] - Complexity of implementing new models of care [66] - Bureaucratic rigidity and resistance to change [31,75,91,98,145] - Lack of integrated care initiatives and reactive care models [34,73,104,122] - Workload issues [80,91,123] - Data transfer issues [51] - Resource limitations for training and capacity building [94,97,104,121,123] - Lack of implementation guidelines [32,73] - Logistical and support challenges in non-pharmacological management and withdrawal processes [7,36,101,102] - Limitations in outcome measures /tools to evaluate progress [41] - Resource intensity of an integrated team [83,94,121] - Logistical and support challenges in non-pharmacological management and withdrawal processes [7,36,101,102] - Knowledge and training gaps among healthcare providers [58,94,97,100,117,123] - Dominant biomedical practice [80,93,123]	31
	Community/ care network (interorganizational & pathway levels factors)	- Inadequate/referral inefficiencies [36,66,83] - Fragmented and duplicate diagnostics or imaging [36,66] - Lack of clarity in roles and responsibilities in team-based care [104,121,126,130] - Limited awareness of existing integrated services and networks [93,100] - Limited access to interdisciplinary teams [73,80,94]	12
	Policy/ system level (Macro-level factors)	- Leadership buy-in, bureaucratic rigidity and approval-process delays [51,91] - Policy-practice gaps [32,73,150] - Other health care resource constraints [69,73,80,81,94,104] - Structural and access-related inequities (poverty, lack of transportation, cost of parking, digital access disparities) [36,36,51,95,101,101,108,114] - Lack of integrated care initiatives and reactive care models [34,73,104,122] - Regional differences in healthcare quality [34] - Health systems not aligned with the goals of coordinated care [73,122] - Financial, reimbursement, and payment system barriers [66,80,81,93,104,121,122] - Concurrent healthcare reforms, fiscal insecurities, and disruptions (e.g., COVID-19)[51,149]	21

Type	Socio-ecological model categories	Examples	Number of studies
Facilitators	Intrapersonal level (patient-level facilitators)	- Patient satisfaction, trust, and positive experiences [34,38,82,86,96]	12
		- Patient motivation and engagement [55,62,74]	
		- Patient preferences incorporated into care [74,79]	
		- Co-development of programs with patients [63,107,126]	
	Interpersonal level (provider-patient & interprofessional relationships)	- Collaboration and teamwork across providers [12,39,66,69,72,87,91,125]	15
		- Effective communication and shared decision-making [36,37,66,115]	
		- Strong vision and team synergy [80,107,125]	
		- Strong relational dynamics within care teams [81,118]	
	Organizational level (service delivery and institutional context)	- Structured protocols and follow-up systems [66,72,81]	18
		- Healthcare providers' training and professional competence [31,46,86,97,123,135]	
		- Peer support and collaborative learning among providers [52,63,115]	
		- Use of technology and digital tools within care delivery [31,91,101,123]	
		- Availability of supportive infrastructure (software, platforms) [61,109]	
		- Organizational adaptability and flexibility [79,123]	
		- Service design improvements and accessibility within organizations [32]	
	Community/ care network level (interorganizational & care pathway)	- Integrated care pathways and coordination across services [69,72,118]	9
		- Co-location of services and multidisciplinary access [81,135]	
		- Stakeholder engagement across care settings [34,82]	
		- Improved accessibility to services across the network [79,87]	
	Policy/ system level (Macro-level facilitators)	- System-level enablers and governance support [61,87,122]	8
		- Policy, economic alignment supporting integrated care [81,123]	
		- Financial mechanisms and co-payment structures facilitating access [32,122]	
		- Alignment of healthcare systems with integrated care models [89,135]	

Discussion

This scoping review provides a comprehensive overview of how integrated care is conceptualized, organized, delivered, and evaluated for adults with chronic MSK disorders. Our review identified substantial heterogeneity in how IC for chronic MSK conditions was conceptualized or operationalized across studies, suggesting diverse approaches to delivering integrated care. Although IC is not a one-size-fits-all approach to care, the fragmented landscape of the delivery approach underscores both potential and limitations in the current IC models in addressing the complex needs of people with chronic MSK disorders. A key point is that the conceptualization and definition of integrated care are not used synonymously in this study. Several of the included papers described the goals, components, or service arrangements of IC without providing an explicit formal definition of integrated care itself. In this review, the emphasis was therefore primarily on how IC was conceptualized or operationalized through reported components and service delivery features, rather than comparing definitions across studies.

This review identified six dominant themes in the conceptualization of IC, ranging from a multidisciplinary collaboration among various healthcare providers to value-based and accountable models of care. Notably, the biopsychosocial and multidisciplinary approach to care dominates how integrated care is organized to support people with chronic MSK conditions. Additionally, the biopsychosocial model was the most frequently cited theoretical framework guiding the delivery of this care approach. This aligns with literature that promotes a holistic care approach for chronic MSK conditions [152]. The variety in how IC is conceptualized for chronic MSK disorders reflects its adaptability to different contexts and the overall aims of the care approach (e.g., addressing pain-related disability versus the broader health and social care needs). However, it also indicates a lack of consensus on the core components of IC.

This review found that the components of IC interventions varied, likely reflecting inconsistencies in how IC is conceptualized and implemented across the broader integrated care literature. IC is described using various terms, including '*integrated care pathway*', '*value-based care pathway*', '*continuity of care*', '*care transition*', and '*coordinated care*', across different systems and settings [23]. As a result, the focus of integration, the tools used, and the models of integration influence the components of the intervention. Notably, the most frequently referenced components of IC identified in this scoping review were care coordination within the care team, patient-centredeness, shared values and vision, workforce capacity and capability, system-wide governance and leadership, and shared responsibility. These findings suggest that integration, communication, and collaboration are more commonly emphasized among professionals working within the same team, unit, organization, often in shared settings with common responsibilities. This aligns with our observation that components such as collaboration and shared responsibility are essential for achieving functional service integration [30]. Components such as the

alignment payment system and digital tools were less commonly referenced in the studies. This may mean that these components are desirable or enabling elements that strengthen and sustain IC and their implementation likely depends on broader contextual factors, including the maturity of the health system [30].

While variability in the operationalization or conceptualization of IC is not inherently problematic, it is important to adopt a unified conceptual definition of IC for chronic MSK disorders to ensure effective implementation. However, whether the use of a unified conceptual definition translates into improved implementation or outcomes remains an open research question. Nonetheless, the variation in how the IC model is conceptualized may influence implementation, scalability, and policy alignment of the approach [153]. There might be a need for a unifying conceptual framework that clearly defines core components, guiding principles, and outcome measures specific to chronic MSK disorders to improve consistency, comparability, and policy integration across health and social care systems [154].

A notable finding was the predominance of horizontal service integration, suggesting that the published chronic MSK literature primarily describes coordination within healthcare teams rather than on broad cross-sectoral or whole-system integration. This finding should be interpreted cautiously. It may reflect genuine implementation challenges in linking healthcare with social care, community, employment, and other sectors. It may also reflect the limits of published literature captured in this review, as more mature system-level models may be described in organizational reports, commissioning documents, or integrated care strategies rather than journal publications. For instance, in the United Kingdom, the integrated care policy explicitly emphasizes partnerships across sectors to address the wider determinants of health, indicating that the broader ambition may not be fully visible through condition-specific peer-reviewed studies alone [155]. Regardless, it is noteworthy to point out that without strong sectoral and system integration, the service delivery model risks reinforcing silos and limiting its potential to address the complex health and social needs of people with the condition [154,156]. Specifically, sectoral and whole-system integration are vital for addressing social determinants of health and the multifaceted nature of chronic MSK conditions [29,154].

This review found that caregiver partners and other supportive social networks are rarely mentioned as involved in the MSK care process, despite growing recognition of their role in supporting patients' healthcare journeys, including access, adherence, continuity of care, and care navigation [157,158]. Only 5% of papers discussed caregiver engagement, and even fewer addressed community partnerships. The underutilization of caregiver partners and community partnerships in the MSK care process represents a missed opportunity to expand care beyond healthcare institutions and into the places where people live, work, and recover. Furthermore, the limited integration of social care providers (12.4%) and care coordinators/navigators (17.5%) in the chronic MSK care process reflects a narrow operational scope of IC for chronic MSK disorders. Ideally, social care providers and care coordinators help people with chronic health conditions, especially those with complex needs, to navigate the health and social care system and access community-based resources [159].

This scoping review also highlights primary care as an important setting for IC delivery, aligning with its role as the first point of entry into the healthcare system. Primary care is crucial for delivering integrated care closer to where people live [160]. However, primary care requires support to deliver optimal care effectively and connect people with chronic MSK conditions with community resources and specialist services, when appropriate. Such support may include, among other options, digital tools for care (e.g., virtual/telemedicine) and platforms for care coordination (e.g., referrals) [161].

The review identified relatively limited reporting of fully virtual service models (only three studies) [54,113,134] and modest emphasis on digital integration. This should not be interpreted as evidence that digital MSK service delivery is uncommon in practice. Rather, it suggests that fully virtualized, integrated care services for people with chronic MSK conditions were underrepresented in the reviewed studies. In some health systems [162–164], remote consultations are supported as part of a blended model of adult MSK physiotherapy service delivery. The underrepresentation of virtual care in this review likely reflects its scope, the terminology used to describe digitally enabled services, and a publication lag stemming from rapid service adaptations during and after the COVID-19 pandemic. Future reviews may therefore benefit from a more focused examination of digitally enabled and hybrid MSK care models, including grey literature and service reports.

This review found that much of the IC evaluation focuses on patient-reported and clinical outcomes, particularly pain, physical function, health-related quality of life, mental health symptoms, and satisfaction. This pattern is broadly consistent with the broader set of patient-reported outcome measures (PROMs) and patient-reported experience measures (PREMs) described in the literature [165,166]. Future evaluations of integrated chronic MSK care may benefit from aligning existing patient-reported and clinical outcomes with broader system and implementation measures relevant to the integrated care objectives [167,168]. Broader domains such as provider experience, health experience, and health equity may also be considered consistent with the Quintuple Aim framework, although these dimensions were only sparsely represented in the reviewed studies.

Although most studies described direct involvement of people with chronic MSK conditions in the care process, caregiver partners and support networks were rarely engaged in the integrated care delivery process. In addition, only a few studies reported integrated care services were co-designed or co-produced with people with lived experience, caregiver partners, or community organizations [59,68,94,109,114,132]. This suggests that integrated care remains largely healthcare-centric and may not fully incorporate the health and social care needs of people with lived experience, as well as the broader social and community dimensions of care.

Shared values at both the individual and organizational levels, system-wide leadership, and digital solutions were considered fundamental to facilitate the delivery of care in an integrated manner. However, their implementation remains inconsistent across the reviewed papers. Additionally, the review identified systemic and structural challenges or barriers to adopting an IC model for chronic MSK disorders. Issues related to governance, leadership and change management, health workforce capacity, and payment models (i.e., misaligned payment systems) are key concerns that must be addressed to enable proper integration and functioning between services. These barriers are commonly acknowledged in broader IC literature [169,170].

In conclusion, this scoping review highlights the diverse nature of IC for chronic MSK disorders. While there is growing interest in IC as a strategy to address the complex health and social care needs of people with chronic MSK disorders, significant gaps in the system-level integration of services remain. The

dominance of horizontal integration and limited involvement of caregiver partners, social networks (e.g., support groups), and community sectors suggests that IC for chronic MSK disorders remains largely confined within traditional healthcare boundaries. Additionally, collaboration between providers from different disciplinary backgrounds needs to be strengthened. There is a need to focus on adopting and transitioning to a whole-system approach to care, bridging silos between community, primary, secondary, and tertiary care within current health systems. It is also important to adopt a comprehensive framework, such as the Quadruple Aim, when evaluating outcomes of integrated MSK services.

This study has some strengths and limitations. Strengths include comprehensive search across multiple major databases and rigorous review procedures, including piloting, consultation with experts in the area, and screening by independent reviewers. Some limitations should also be acknowledged. First, there is a geographic bias, as most papers originate from North America and Europe. This restricts the generalizability of the results for low-and middle-income countries in the Global South. Another limitation relates to the conceptual ambiguity of IC in the chronic MSK space. The reviewed papers defined/conceptualized IC based on the goals of the interventions. The absence of a standardized language related to the model[20] creates inconsistency in the implementation and evaluation of the model. This is understandable given the short history of the integrated care programs across various health systems[154] and we anticipate that the conceptualization of IC for chronic MSK disorders will develop as health systems worldwide progress towards maturity. Finally, although grey literature was considered, this review did not claim to comprehensively map all organizational reports and service evaluations. As a result, cross-sector and system-level integration of MSK services may be underrepresented. Future research should extend beyond peer-reviewed literature to include organizational reports and other grey literature to investigate the scope of IC among people with chronic MSK conditions. The findings of this study reveal opportunities for further research, service improvements, and policy initiatives to support the design, implementation, and evaluation of IC for chronic MSK disorders. Given the unique and complex needs of people with chronic MSK conditions, future efforts should focus on standardizing and validating conceptual frameworks, including outcome measures that guide IC service delivery. It is also crucial to expand IC research in underrepresented regions and populations to ensure global relevance and equity of integrated care models. For practice, it is essential to move beyond collaborative approaches among providers towards cross-sectoral and system integration to enhance care continuity, responsiveness, and the sustainability of innovative MSK care delivery methods. Additionally, leveraging advancements in digital transformation is vital for innovating virtual and hybrid MSK service delivery approaches across systems.

Because this scoping review was intended to map how IC was conceptualized and delivered, rather than to evaluate its effectiveness, any implications for policy should be interpreted with caution. The findings are better understood as highlighting areas that warrant future policy attention, such as governance, workforce capability, digital infrastructure, co-production, and cross-sector coordination, rather than direct policy recommendations. Future research is needed to establish the effectiveness, cost-effectiveness, scalability, and broader value of integrated care models before stronger policy recommendations can be justified.

Declarations

Ethics approval

No ethics approval was needed to conduct this study.

Consent for publication

The authors declare that this scoping review has not been published previously and is not under consideration for publication elsewhere.

Availability of data and materials

Data and supporting materials to prepare this manuscript can be provided upon request**.**

Conflict of interest

The authors declare no conflict of interest related to this study, including authorship and publication of this article.

Funding disclosure

This scoping review is part of a larger project that explores integrated care for chronic musculoskeletal disorders in Southwestern Ontario, Canada. The lead author (MBC) received funding support from the Canadian Institutes of Health Research (CIHR) – Research, Excellence, Diversity, and Independence (REDI) to conduct the current project. CIHR had no role in the conduct of this study, including data collection, analysis, interpretation, and write-up of this manuscript.

Authorship

All authors made significant contributions to this study and met authorship criteria. MBC, SS, JE, DW, RB, and MS contributed to the study design. MBC, SW, G, DD, EY conducted screening and full-text review. MBC and SW extracted data from the included papers. All authors reviewed the data, contributed to the writing process, provided feedback, and approved the final manuscript.

Acknowledgement

The authors would like to acknowledge the support of a research librarian for their contributions to database selection, search strategy development, and the execution of the literature search.

Supplemental files

Supporting files for this study are available online.

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Figures

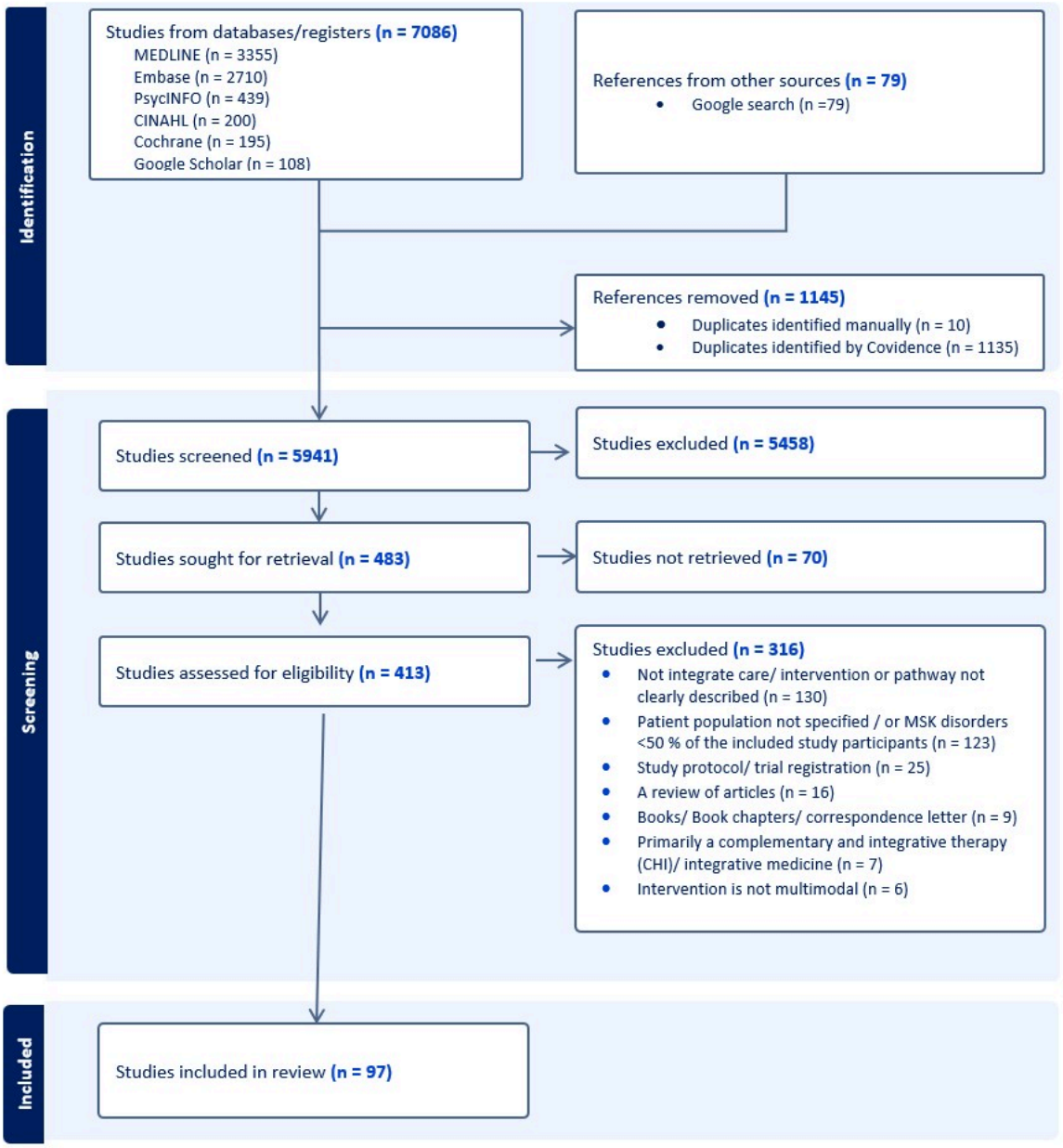


Figure 1

Records sought for retrieval

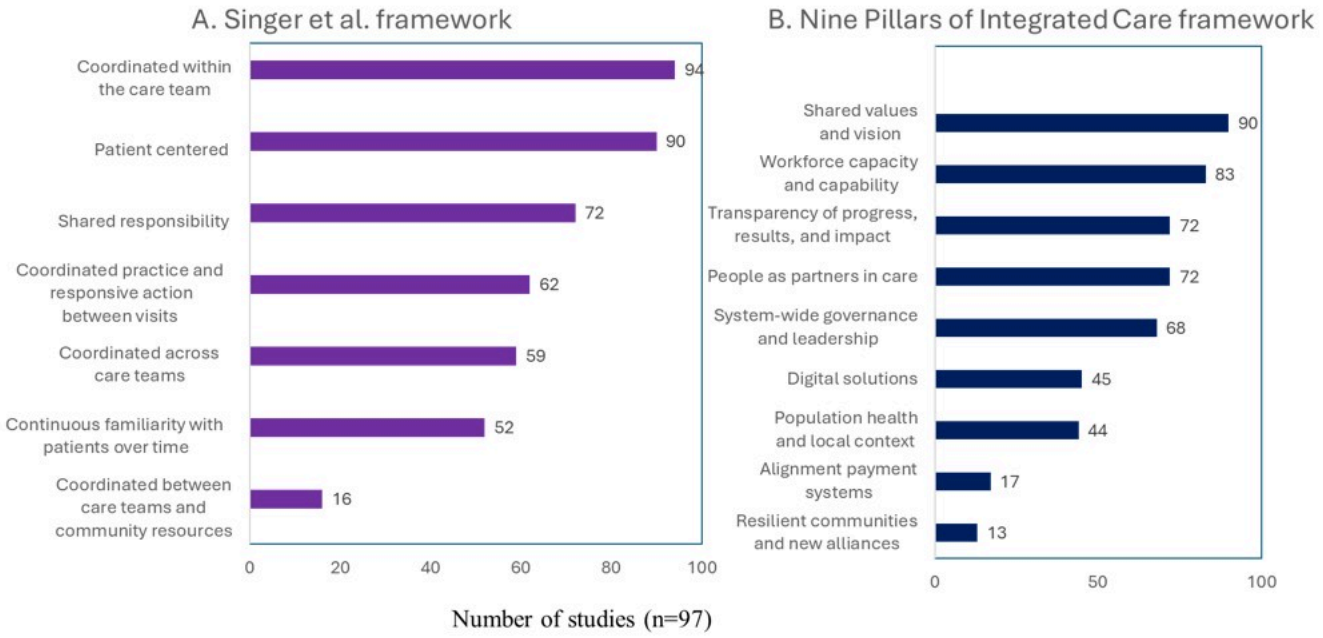


Figure 2

Components of integrated care mapped against the two IC frameworks

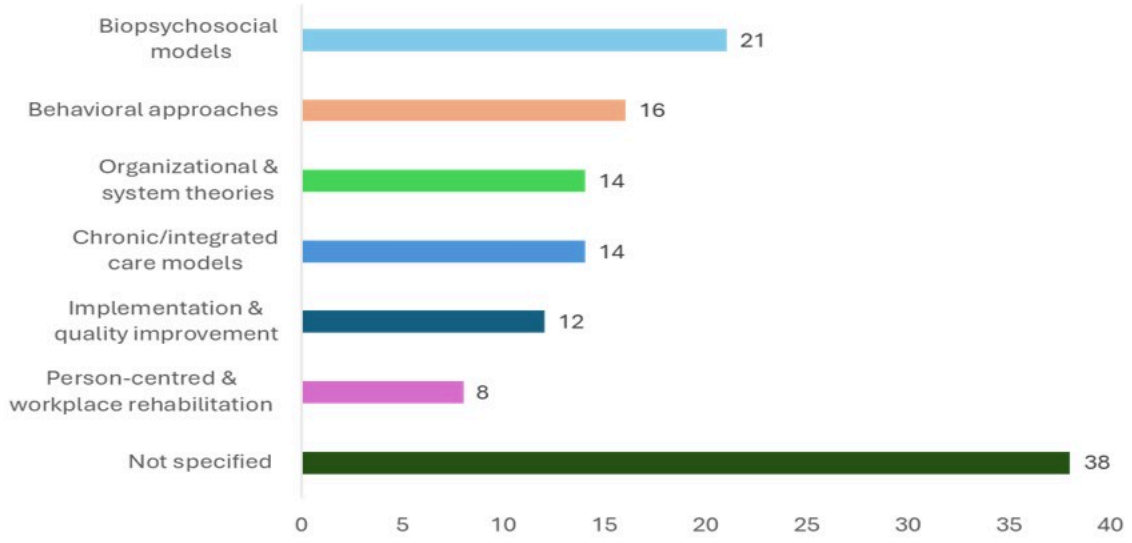


Figure 3

Frameworks, models, and theories underpinning integrated care service delivery

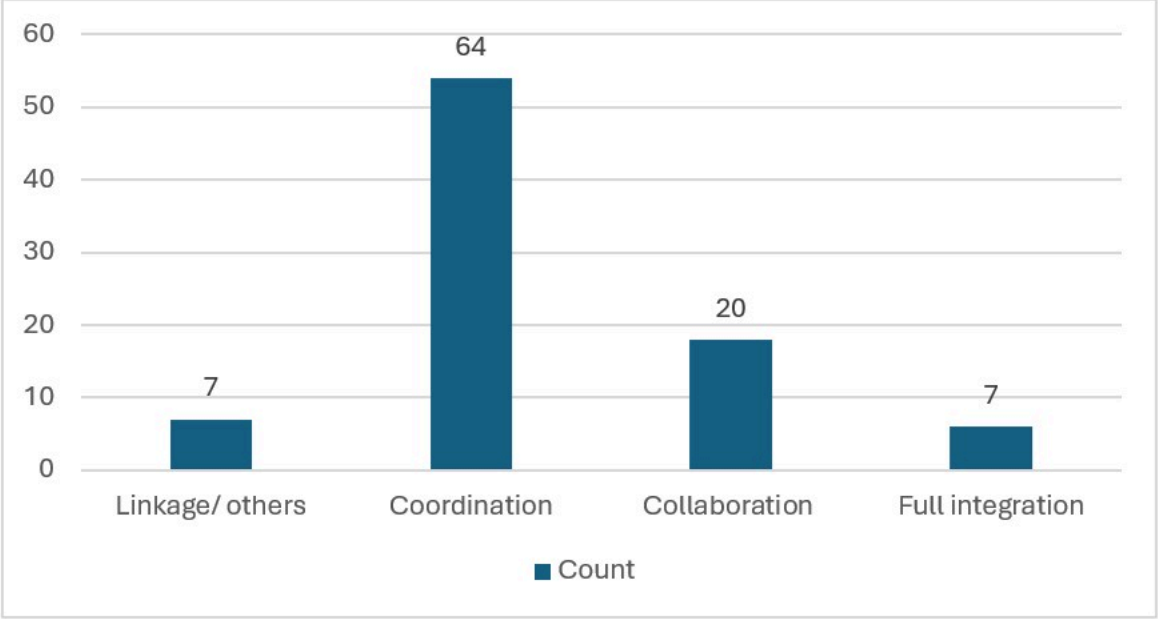


Figure 4

Bar graph showing the degree of service integration across included studies

Supplementary Files

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- SupplementaryFile1searchterms.docx
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- SupplementaryFile4studycharactersticsV2.docx
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