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A scoping review on implementation processes and outcomes of models of care for low back pain in primary healthcare

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Abstract

Background To address the societal burden of low back pain (LBP), several health systems have adopted Models of Care (MoCs). These evidence-informed models aim for consistent care and outcomes. However, real-world applications vary, with each setting presenting unique challenges and nuances in the primary healthcare landscape. This scoping review aims to synthesize the available evidence regarding the use of implementation theories, models or frameworks, context-specific factors, implementation strategies and outcomes reported in MoCs targeting LBP in primary healthcare.

Methods MEDLINE(Pubmed), EMBASE, Cochrane Central Register of Controlled Trials, PEDro, Scopus, Web of Science and grey literature databases were searched. Eligible records included MoCs for adults with LBP in primary healthcare. Two reviewers independently extracted data concerning patient-related, system-related and implementation-related outcomes. The implementation processes, including guiding theories, models or frameworks, barriers and facilitators to implementation and implementation strategies were also extracted. The data were analysed through a descriptive qualitative content analysis and synthesized via both quantitative and qualitative approaches.

Results Eleven MoCs ($n=29$ studies) were included. Implementation outcomes were assessed in 6 MoCs through quantitative, qualitative, and mixed methods approaches. Acceptability and appropriateness were the most reported outcomes. Only 5 MoCs reported underlying theories, models, or frameworks. Context-specific factors influencing implementation were identified in 3 MoCs. Common strategies included training providers, developing educational materials, and changing record systems. Notably, only one MoC included a structured multifaceted implementation strategy aligned with the evaluation of patient, organizational and implementation outcomes.

Conclusions The implementation processes and outcomes of the MoCs were not adequately reported and lacked sufficient theoretical support. As a result, conclusions about the success of implementation cannot be drawn, as the strategies employed were not aligned with the outcomes. This study highlights the need for theoretical guidance in the development and implementation of MoCs for the management of LBP in primary healthcare.

Registration Open Science Framework Registries (https://osf.io/rsd8x).

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Keywords Low back pain, Primary health care, Quality of health care, Health services research, Outcome and process assessment, Health care

Background

Low back pain (LBP), defined as pain in the area between the posterior lower margins of the twelfth ribs and the gluteal folds, with or without leg pain [1], is the leading cause of disability worldwide [2]. LBP patients are typically complex and heterogenous due to the influence of multiple genetic, physical, psychological and social factors [3, 4]. In 2020, 619 million (95% UI: 554–694) people reported LBP, with projections indicating a 36.4% increase by 2050 [2]. LBP is now recognized as a major public health problem that affects individuals' daily lives and places a considerable burden on healthcare systems due to high healthcare resource consumption and costs associated with its management [5–8].

This acknowledgement triggered a global call for health systems to take action [9, 10]. The implementation of models of care has been proposed as a promising solution to promote high-quality, efficient and sustainable healthcare. A Model of Care (MoC) is a person-centred and evidence-informed guide that describes the care to be provided for particular health conditions and how to implement it [11, 12]. The main objectives of MoCs are to support best practices, decrease care variability and promote better health outcomes, efficient resource utilization and cost reduction [9, 13–15].

MoCs typically reflect regional or national health policies that are implemented as health services in local settings [11, 16]. The local implementation of a MoC is usually known as 'model of service delivery' [15]. When implemented locally, a MoC includes the key core components from the system-level framework, while adaptations are allowed to meet specific contexts and needs [15].

As the management of people with LBP is recommended within primary healthcare settings [17, 18], several MoCs have been implemented in this context in recent years [19–47]. However, findings related to patient, system and implementation outcomes are heterogeneous. For example, the most widely known MoC, the STarT Back implemented in the United Kingdom, improved clinical outcomes at 3, 4 and 6 months and reduced healthcare costs compared with usual practice [48–50]. Conversely, an adaptation of this MoC in the United States of America, known as MATCH, reported no significant effect on patient outcomes or healthcare use [47]. A subsequent qualitative study revealed that these results were due to an unsuccessful implementation process, with healthcare professionals failing to provide the recommended interventions [21].

Indeed, a health intervention may be effective in one context but may not yield similar outcomes elsewhere. Furthermore, being evidence-informed does not guarantee that it will be adopted by healthcare professionals or patients [51, 52]. These paradoxes are often attributed to the complexity of interventions, implementation processes and context-specific characteristics, which impose several challenges to the adoption of interventions in real-world settings.

These challenges cover several patient, organizational and system factors that may hinder the successful implementation of a MoC. These include but are not limited to health professionals' time constraints, insufficient skills and difficulties in changing routines, inconsistencies between research findings and everyday practices, lack of support from managers, organizational culture and funding issues [53–57]. Despite the growth of implementation research targeting LBP in recent decades [57], the influence of context-specific factors on the implementation of MoCs in primary healthcare remains poorly understood. Recognizing these barriers may enable implementers to develop strategies to address them and optimize their efforts [52].

Defining implementation strategies is also an essential step in overcoming known barriers [11]. These strategies are methods designed to enhance the adoption and sustainability of evidence-based interventions, programs or innovations [58]. Three reviews analysed implementation strategies for LBP interventions [57, 59, 60]. Two of these reviews included solely randomized controlled trials (RCTs) [59, 60], whereas the third focused on guidelines, policies and MoCs implemented only in Australia [57]. The generalizability of their findings may be limited due to the context-dependent nature of implementation research, which often uses qualitative and mixed methods approaches. Furthermore, implementation studies frequently do not adequately report the strategies employed [57, 61, 62], underscoring the need for rigorous evidence mapping of this topic.

Additionally, implementation strategies may be considered effective if they lead to improvements in outcomes [63]. Evaluating the success of a MoC requires the assessment of patient-related (e.g., function and quality of life), system-related (e.g. timeliness of services and referrals) and implementation-related outcomes (e.g. acceptability and adoption) [11, 63]. This knowledge is critical to informing implementers about which MoC to adopt in their settings and to replicate findings in subsequent research and practice [64, 65]. Consistent reporting of implementation outcomes is also necessary to

understand and compare the effectiveness of implementation strategies across different contexts [66]. To our knowledge, there is no available literature capturing the outcomes assessed in MoCs implemented for LBP in primary healthcare.

This scoping review complements the findings of a previous study [67] that provided an in-depth description of the core characteristics and key common elements of MoCs implemented in primary healthcare for the management of LBP. After identifying the MoCs and their characteristics, our objective is to synthesize the available research regarding their outcomes and implementation processes, including the use of theories, models or frameworks, context-specific factors and implementation strategies.

Methods

This study followed the Joanna Briggs Institute scoping review guidance [68, 69] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) recommendations [70] (Additional File 1). The protocol was previously published [71] and registered within the Open Science Framework Registries (https://osf.io/rsd8x). No patient or public involvement occurred in the design, conduct, reporting, or dissemination of this research.

Research questions

The research questions of this study are as follows:

- What are the patient-related, system-related and implementation-related outcomes of the MoCs, and how have they been measured?
- What are the key processes involved in the implementation of the MoCs for LBP patients in primary healthcare, concerning guiding theories, context-specific factors, and implementation strategies?

Inclusion criteria

The eligibility criteria comprised [69, 72]:

(1) Population: MoCs specifically directed to adult (≥ 18 years old) patients with non-specific LBP, with or without radicular pain, regardless of duration (acute, subacute or chronic). Records related to specific pain causes or broader populations, such as "musculoskeletal pain" or "spinal pain", were excluded. MoCs comprising radiculopathy were also excluded unless they clearly addressed the management of non-specific LBP.

(2) Concept: The MoC outlines best practices for LBP and guides *what* interventions patients should receive and *how* to implement them [11, 12, 73].

(3) Context: MoCs contain primary healthcare interventions, as this is the recommended setting for LBP management [13, 74].

Search strategy

This review includes studies from peer-reviewed primary research (quantitative, qualitative, and mixed-methods study designs) and grey literature (organizational reports, policy documents, research reports, pilot studies, dissertations and theses) published since 2000 and in English, Portuguese or Spanish [71].

Searches were carried out in databases of peer-reviewed research and grey literature from January 2022 until the last update in December 2022. These included MEDLINE(PubMed), EMBASE, the Cochrane Central Register of Controlled Trials, PEDro, Scopus, Web of Science, Grey Literature Report, MedNar Search Engine and the World Health Organization Institutional Repository for Information Sharing (WHO-IRIS). Tailored search strategies (Additional File 2) were performed across all databases, and these were reviewed by an experienced information scientist (HD).

Study selection

All studies were uploaded to EndNote X9 (Clarivate Analytics, USA) for selection. Pilot screening of the first 25 titles and abstracts, plus 10 full texts, was conducted by the reviewers to ensure consistency. Adjustments to the eligibility criteria were made until an agreement of 75% or higher was reached [75]. Two pairs of researchers independently screened titles and abstracts (STD and DC) and full texts (STD and AM). Discussions among reviewers were held to resolve disagreements in both phases, and a third reviewer (DC) was consulted in the full-text screening phase when necessary.

Data extraction

A standardized form (Additional File 3) was developed [69] and piloted by the two review authors (STD and AM), who independently extracted the data. Reviewers met bimonthly by videoconferencing to discuss and compare the data. Any discrepancies were examined either between the reviewers or with the research team, as needed. Additionally, the authors of the studies were emailed to clarify uncertain information and/or request missing data related to the MoCs. Meetings with the research team were carried out to discuss the progress of data extraction and preliminary results.

The following data were extracted: (1) a summary of the studies (title, authors, year of publication, citation,

source of peer-reviewed/grey literature, study design, study objectives and sample size); (2) identification of the MoC (name, country and target population); (3) patient-related, system-related and implementation-related outcomes [11, 63] and their outcome measures. The implementation outcomes were described using Proctor and colleagues' taxonomy [63], which distinguishes seven constructs: *acceptability*, *adoption*, *appropriateness*, *feasibility*, *fidelity*, *implementation costs*, *penetration*, *and sustainability*; (4) barriers and facilitators to implementation at system, organizational, patient and multiple levels [5]; (5) guiding theories, models or frameworks, categorized by Nilsen (2015) [76]; and (6) implementation strategies classified through the Expert Recommendations for Implementing Change (ERIC) taxonomy [77]. These strategies were grouped into the following categories: *train and educate stakeholders*, *support clinicians*, *provide interactive assistance*, *use evaluative and iterative strategies*, *develop stakeholder interrelationships*, *change infrastructure*, *utilize financial strategies* and *adapt and tailor to context* [78].

Synthesis and presentation of results

Findings were synthesized through descriptive qualitative content analysis [79], employing a deductive approach [11]. In anticipation of significant inconsistency in data reporting across studies [66, 80], an analytical interpretation of the contents was planned. Reviewers (STD and AM) independently classified the data according to established taxonomies, followed by discussions to resolve discrepancies among reviewers and with the research team, as necessary.

Data synthesis incorporated both quantitative and qualitative methods. The quantitative approach included frequency counts (e.g., literature search, characteristics of the studies and outcomes/outcome measures), whereas qualitative methods comprised description of themes (e.g., barriers, facilitators and clusters of implementation strategies). The results were summarized in narrative and tabular formats and organized to answer the research questions and according to each MoC.

Protocol deviations

The study methods are fully described in the protocol [71] and the preceding article [67], but a few alterations warrant mention. First, the research question concerning the implementation processes of the MoCs was refined. While the original focus was solely on identifying context-specific factors, we recognized the importance of addressing the underlying theories, models or frameworks, and implementation strategies, to understand how these may have influenced outcomes. Additionally, we added a criterion excluding digital MoCs, such as telemedicine, telerehabilitation, web-based programs and/or mobile apps.

Results

Literature search

A total of 4081 records were screened for eligibility. Overall, 3255 relevant titles and abstracts were identified for potential inclusion. After the removal of duplicates, 255 full texts were evaluated and 29 studies met the inclusion criteria. Figure 1 presents the PRISMA flow diagram detailing the selection process.

Characteristics of the included studies

The included studies portray 11 MoCs implemented in primary healthcare for LBP: STarT Back [19, 20, 31, 41–43], SCOPiC [44–46], MATCH [21, 47], TARGET [22–24], BetterBack☺ Model of Care [25–28], Low Back and Radicular Pain (LBRP) Pathway [29, 30, 32–34], Beating Back Pain Service (BBPS) [35], North East (NE) Essex Primary Care Trust (PCT) service [36], Interprofessional Spine Assessment and Education Clinics (ISAEC) [37], Saskatchewan Spine Pathway (SSP) [38, 39] and Back Pain Assessment Clinic (BAC) [40].

Table 1 outlines each MoC regarding the country of implementation, target population, corresponding studies, study design and objectives. Of the 29 studies, 19 were quantitative, 5 were qualitative and 5 used a mixed-methods approach. Five MoCs (STarT Back, SCOPiC, MATCH, TARGET, BetterBack☺) were assessed for clinical effectiveness or efficacy, while 8 MoCs (STarT Back, SCOPiC, MATCH, TARGET, LBRP Pathway, NE Essex PCT service, ISAEC, SSP) reported healthcare resource utilization. Moreover, the cost-effectiveness of 2 MoCs (STarT Back and SCOPiC) and the cost-utility of the STarT Back were evaluated through RCTs.

Four cohort studies (corresponding to the LBRP Pathway, NE Essex PCT service and BAC) assessed clinical outcomes. The implementation process was evaluated in 6 MoCs (SCOPiC, MATCH, BetterBack☺, LBRP Pathway, BBPS and BAC) through RCTs, cohort, qualitative and mixed-methods studies.

Research question 1: what are the patient-related, system-related and implementation-related outcomes of the MoCs and how have they been measured?

Only 4 MoCs (SCOPiC, MATCH, BetterBack☺ and LBRP Pathway) were assessed across all three domains. The most common outcomes were those linked to symptoms and disease severity, healthcare service utilization and acceptability of the MoCs. The remaining MoCs were appraised in two domains, mainly through patient and system outcomes, with limited representation of the implementation outcomes. Overall, outcomes were measured at various time points up to one year, including

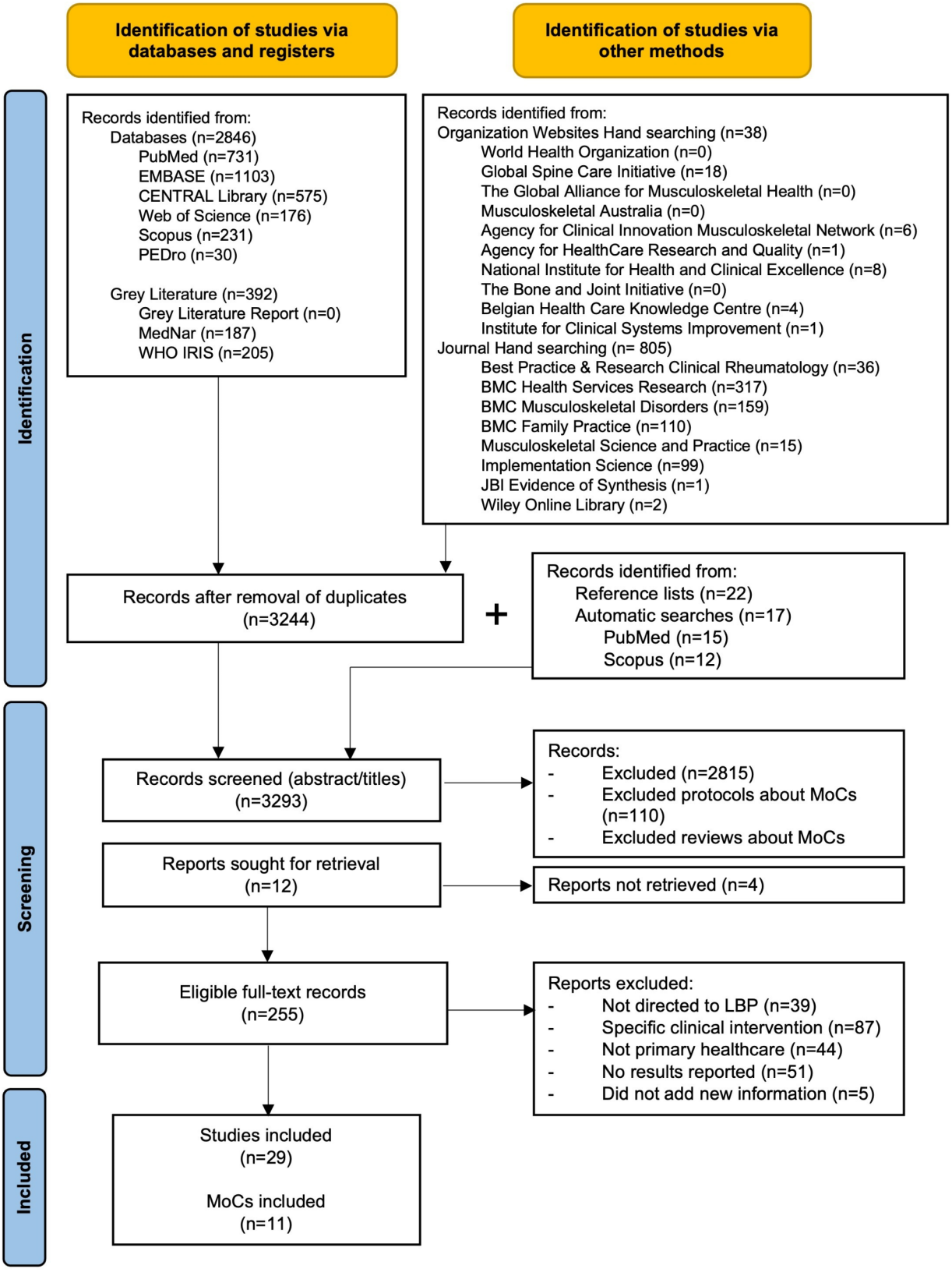

Fig. 1 PRISMA flow diagram of included studies

Table 1 Identification of the MoCs and corresponding studies

MoC designation	Country	Population	Study	Type of study	Objectives of the study
START BACK Subgroups for Targeted Treatment	UK	LBP, radiculopathy	Hill et al. (2011) [19]	RCT	Clinical effectiveness, cost-effectiveness and report of healthcare resources utilization
			Whitehurst et al. (2012) [20]	RCT	Cost-utility and report of healthcare resources utilization
			Foster et al. (2014) [31]	Observational cohort (before-after)	Clinical efficacy, cost-effectiveness and report of healthcare resources utilization
			Whitehurst et al. (2015) [41]	RCT	Cost-utility and report of healthcare resources utilization
	Ireland	LBP, radicular pain	Murphy et al. (2016) [42]	Nonrandomized controlled trial	Clinical effectiveness
	Denmark	LBP, radicular pain	Morsø et al. (2021) [43]	RCT	Clinical efficacy, cost-effectiveness and report of healthcare resources utilization
SCOPiC SCiatica Outcomes in Primary Care	UK	LBP, radicular pain (suspected sciatica)	Saunders et al. (2020) [44]	Qualitative	Evaluation of the implementation
			Konstantinou et al. (2020) [45]	RCT	Clinical effectiveness, cost-effectiveness and report of healthcare resources utilization
			Foster et al. (2020) [46]	Mixed methods	Clinical effectiveness, cost-effectiveness, report of healthcare resources utilization and evaluation of the implementation
MATCH Matching Appropriate Treatment to Consumers' Healthcare needs	USA	LBP	Cherkin et al. (2018) [47]	Cluster RCT	Clinical efficacy and report of healthcare resources utilization
			Hsu et al. (2019) [21]	Qualitative	Evaluation of the implementation
TARGET Targeted Interventions to Prevent Chronic Low Back Pain in High-Risk Patients	USA	LBP	Beneciuk et al. (2019) [22]	Qualitative	Evaluation of the training
			Middleton et al. (2020) [23]	Mixed methods	Evaluation of the implementation
			Delitto et al. (2021) [24]	Cluster RCT	Clinical effectiveness and report of healthcare resources utilization
BETTERBACK☺ Model of Care	Sweden	LBP	Schröder et al. (2020) [25]	Observational cohort, before-after	Evaluation of the implementation
		LBP, radiculopathy	Enthoven et al. (2021) [26]	Qualitative	Evaluation of the implementation
			Schröder et al. (2021) [27]	Cluster RCT	Clinical effectiveness and evaluation of the implementation
			Schröder et al. (2022) [28]	Cluster RCT	Evaluation of the implementation
Low Back and Radicular Pain Pathway	UK (National)	LBP, radicular pain	Greenough (2017) [29]	Report (grey literature)	Report of healthcare resources utilization
		Sciatica	Ryan et al. (2020) [30]	Qualitative	Evaluation of the implementation
	UK (North)	LBP, radicular pain	Martin et al. (2018) [32]	Mixed methods (grey literature)	Evaluation of the implementation
	UK (North East)	LBP, radicular pain	Jess et al. (2018) [33]	Observational cohort	Report of changes in clinical outcomes
			Jess et al. (2021) [34]	Observational cohort	Report of changes in clinical outcomes
Beating Back Pain Service (BBPS)	UK	LBP	Cheshire et al. (2013) [35]	Mixed methods	Evaluation of the implementation
North East (NE) Essex Primary Care Trust (PCT) service	UK	Back or neck pain	Gurden et al. (2012) [36]	Observational cohort	Report of changes in clinical outcomes and healthcare resources utilization
Inter-professional Spine Assessment and Education Clinics (ISAEC)	Canada	LBP	Zarrabian et al. (2017) [37]	Observational cohort	Report of healthcare resources utilization
Saskatchewan Spine Pathway (SSP)	Canada	LBP, radicular pain	Kindrachuk & Fourney (2014) [38]	Retrospective study, registry-based	Report of healthcare resources utilization
			Wilgenbusch et al. (2014) [39]	Retrospective study, registry-based	Report of healthcare resources utilization
Back pain Assessment Clinic (BAC)	Australia	LBP and neck pain	Moi et al. (2018) [40]	Observational cohort pilot study	Report of changes in clinical outcomes and evaluation of the implementation

assessments for relatively long follow-up periods (>6–12 months). Table 2 summarizes these outcome domains and follow-up evaluations. Additional information regarding outcomes and outcome measures can be found in Additional File 4.

Patient-related outcomes and outcome measures

Patient-related outcomes were divided into three subdomains: symptoms and disease severity, psychosocial and work-related outcomes. All the MoCs evaluated patient-related outcomes, particularly symptoms and disease severity ($n=11$). A total of 20 outcomes were assessed within this subdomain, with disability ($n=7$), back pain intensity ($n=7$) and global improvement ($n=7$) being the most frequently reported. Disability was measured through the Roland Morris Disability Questionnaire (RMDQ) or Oswestry Disability Index (ODI), whereas back pain intensity was assessed through the Numerical Rating Scale (NRS) or Visual Analogue Scale (VAS). The measures used to evaluate global improvement were very heterogenous, varying from single questions with Likert scales to validated instruments, such as the Patient Global Impression of Change (PGIC).

Psychosocial outcomes were appraised in 6 MoCs (STarT Back, SCOPiC, MATCH, BetterBack☺, LBRP Pathway and BBPS). The most common outcomes were anxiety and depression ($n=4$), fear-avoidance beliefs ($n=3$) and pain self-efficacy ($n=3$). All studies assessing anxiety and depression used different outcome measures. Conversely, fear-avoidance beliefs and pain self-efficacy were consistently assessed using the Tampa Scale of Kinesiophobia (TSK) and the Pain Self-Efficacy Questionnaire (PSEQ), respectively.

Five MoCs (STarT Back, SCOPiC, MATCH, BBPS and NE Essex PCT service) also evaluated work-related outcomes. Employment status was assessed via a single question in 4 MoCs. Work and productivity losses were assessed in 3 MoCs through 5 different outcome measures.

System-related outcomes and outcome measures

Ten MoCs (STarT Back, SCOPiC, MATCH, TARGET, BetterBack☺, LBRP Pathway, NE Essex PCT service, ISAEC, SSP and BAC) were assessed for system-related outcomes. These were divided into healthcare service utilization, quality of care and costs. The maximum follow-up period after the intervention was 14 months in the BetterBack☺.

All the MoCs, but BetterBack☺ [25–28], evaluated health services use. The data collected included the frequency of consultations with general practitioners and other healthcare professionals, prescribed medications and imaging, referrals for physiotherapy and secondary care, and waiting times, among others (Additional File

Outcome Domains	Follow-up	STarT Back (UK) (20,31,41,50)	STarT Back (Ireland) (42)	STarT Back (Denmark) (43)	SCOPiC (44–46)	MATCH (21,47)	TARGET (23,24)	BETTERBACK☺ (25–28)	LBPRP Pathway (30,32–34)	BBPS (35)	NE Essex PCT service (36)	ISAEC (37)	SSP (38,39)	BAC (40)
Patient														
Symptoms and disease severity	<3 mo.	X	X		X	X			X	X	X	X		
	3-6 mo.	X	X	X	X	X	X	X	X	X				X
	>6-12 mo.	X		X	X			X	X				X	
	>12 mo.													
Psychosocial	<3 mo.	X	X			X			X	X				
	3-6 mo.	X	X		X	X		X	X	X				
	>6-12 mo.	X			X			X	X					
	>12 mo.													
Work-related	<3 mo.					X				X				
	3-6 mo.	X		X	X	X				X				
	>6-12 mo.	X		X	X									
	>12 mo.													
System														
Healthcare services utilization	<3 mo.								X		X	X		X
	3-6 mo.	X		X		X								
	>6-12 mo.	X		X	X		X						X	
	>12 mo.						X							
Costs	<3 mo.													X
	3-6 mo.	X												
	>6-12 mo.	X		X	X									
	>12 mo.													
Quality of Care assessment	<3 mo.					X			X		X			
	3-6 mo.	X		X	X	X		X						
	>6-12 mo.			X	X			X						
	>12 mo.													
Implementation														
Acceptability	<3 mo.					X			X	X				X
	3-6 mo.				X	X		X	X					
	>6-12 mo.							X	X					
	>12 mo.							X						
Appropriateness	<3 mo.								X	X				X
	3-6 mo.				X			X	X					
	>6-12 mo.							X	X					
	>12 mo.							X						
Feasibility	<3 mo.					X			X					
	3-6 mo.								X					
	>6-12 mo.								X					
	>12 mo.													
Adoption	<3 mo.					X		X	X					
	3-6 mo.							X	X					
	>6-12 mo.							X	X					
	>12 mo.													
Fidelity	<3 mo.							X						
	3-6 mo.							X						
	>6-12 mo.													
	>12 mo.													
Sustainability *(potential)*	<3 mo.							X	X					
	3-6 mo.							X	X					
	>6-12 mo.							X	X					
	>12 mo.													
Implementation Costs	<3 mo.													
	3-6 mo.													
	>6-12 mo.													
	>12 mo.													
Colour key:		Results favour the implementation of the MoC.				Results are inconclusive or the number of outcomes favouring/not favouring the implementation of the MoC is similar.				Results do not favour the implementation of the MoC.				

Table 2 Outcome domains and follow-ups evaluated in the included MoCs

4). Patient self-reported questionnaires, electronic health records, case report forms or national registries were used for data collection.

Quality of care was assessed in 6 MoCs (STarT Back, SCOPiC, MATCH, BetterBack☺, LBRP Pathway and NE Essex PCT service), mainly through patient satisfaction measurements. Regarding adherence to recommendations for LBP treatment, the UK STarT Back [31] was the only MoC evaluating the appropriate use of physiotherapy, while BetterBack☺ [25–28] was the only model assessing adherence to practice guidelines through a clinical practice quality index.

Costs were measured in the STarT Back [19, 20, 31, 41, 43], SCOPiC [44–46] and BAC [40] models. Both STarT Back [19, 20, 31, 41, 43] and SCOPiC [44–46] estimated quality-adjusted life years (QALYs) using the EuroQol EQ-5D at the 6- or 12-month follow-ups. Out-of-pocket expenditures on treatments and/or aids, over-the-counter purchases, and total costs per patient were also reported. In the BAC [40], costs were measured through activity audits over 12 months, estimating cost savings related to MRI scans.

Implementation outcomes, outcome measures and main findings

Implementation outcomes were assessed in 6 MoCs (SCOPiC, MATCH, BetterBack☺, LBRP Pathway, BBPS and BAC), from the earliest stages of implementation to 1-year follow-up. BetterBack☺ [25–28] and LBRP Pathway [30, 32] assessed most of the outcomes in this domain. A detailed description of the findings regarding the implementation outcomes is provided in Additional File 5.

Acceptability[1] and appropriateness[2]

Acceptability and appropriateness were evaluated in several studies [21, 26, 30, 32, 35, 40, 44, 46], mostly through interviews and focus groups. Different stakeholders (key commissioners, clinicians and patients) shared their perspectives on the implementation of the MoCs, their practical use, and the care received/delivered. Overall, all the MoCs were perceived as acceptable and appropriate.

However, some concerns were raised regarding the SCOPiC [44, 46], BetterBack☺ [26] and LBRP Pathway [32]. SCOPiC [44, 46] clinicians expressed reluctance to consider invasive treatment options too early for patients. Also, BetterBack☺ [26] patients reported that group education sessions were too basic and not tailored to their personal needs, while LBRP Pathway [32] patients felt that it was difficult to contribute to management decisions, because these sessions were clinician-led or paternalistic.

Feasibility[3]

Feasibility was assessed in the MATCH [21] and LBRP Pathway [32] at the beginning of implementation through interviews, focus groups and evaluation questionnaires. For example, primary care providers in MATCH [21] found the new workflows adequate, although some expressed concerns about the complexity of the intervention and the extra time and workload. Similarly, in LBRP Pathway [32], healthcare professionals appreciated having clear patient referral points but found excessive the time required for the use of the risk stratification tool.

Adoption[4]

MATCH [21], LBRP Pathway [32] and BetterBack☺ [25–28] evaluated adoption through interviews, focus groups and questionnaires. In the LBRP Pathway [32], healthcare professionals believed that most colleagues engaged with the pathway and its delivery. Also, in BetterBack☺ [25–28] guideline-concordant care improved compared with routine care. However, in MATCH [21], physiotherapists reported alterations in their overall thinking and approach to back pain, but the implementation strategies did not change the treatments offered to patients by primary care providers.

Fidelity[5]

Only BetterBack☺ [25–28] appraised the fidelity of the implementation by measuring the adherence to the program protocol and the quality of care provided through a clinical practice quality index. When guideline-adherent care was provided, most patient-reported outcome measure scores improved, and patients showed significantly higher quality indices and overall adherence than those receiving routine care.

Penetration[6] and Sustainability[7]

Neither penetration nor sustainability was assessed in any of the MoCs. However, potential sustainability

[1] Perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory [63].

[2] Perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem [63].

[3] Feasibility is defined as the extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting [63].

[4] The intention, initial decision, or action to try or employ an innovation or evidence-based practice [63].

[5] The degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers. These include adherence, quality of delivery, program component differentiation, exposure to the intervention and participant responsiveness or involvement [63].

[6] Integration of a practice within a service setting and its subsystems [63].

[7] Extent to which a newly implemented treatment is maintained or institutionalized within a service setting's ongoing, stable operations [63].

challenges were explored 6 to 12 months after the implementation of the LBRP Pathway [32] through stakeholder interviews and focus groups. The main findings highlighted that a general *franchise* model may facilitate MoC transferability to other services. However, patients' accessibility to the service and the classification of all patients on the pathway as urgent were perceived as potentially difficult elements to sustain.

BetterBack☺ also explored the sustainability of the MoC at 3 and 12 months through the Determinants of Implementation Behaviour Questionnaire [25, 81]. Although physiotherapists remained positive regarding the implementation of the MoC, their expectations decreased across most domains in the two follow-ups, suggesting the need for more effective implementation strategies to increase sustainability.

Research question 2: what are the key processes involved in the implementation of the MoCs for LBP patients in primary healthcare, concerning guiding theories, context-specific factors, and implementation strategies?

A full description of the MoCs and their corresponding studies, along with key characteristics (e.g., country, urban/rural areas and health systems) are outlined in a preceding article [67]. This review identified context-specific factors through an analysis of barriers and facilitators to implementation (Table 3), which were reported in only 3 MoCs. TARGET [23] and LBRP Pathway [32] evaluated these factors through interviews and focus groups, whereas BetterBack☺ [25] grounded its implementation strategy on barriers previously identified in a systematic review [79].

System-level factors that could impact the implementation of the MoC were identified solely for the LBRP Pathway [32] through the perspectives of key decision-makers. They reported that the MoC was not a regional or clinical commissioning groups priority. A lack of evidence for some health interventions and insufficient data on outcomes and costs were also mentioned as barriers. However, the added value of the MoC in shifting away from medicalized interventions and decreasing variations in practice was acknowledged.

The influence of organizational-level factors was measured in all 3 MoCs. Barriers to implementation included but were not limited to time constraints, inappropriate referrals, technology difficulties (e.g., tablets and electronic health records), low confidence in skills, and a lack of engagement from healthcare providers. Facilitators involved perceptions of good compatibility between the MoC and existing workflows, and the adaptability of risk stratification processes, as reported in TARGET [23]. In the LBRP Pathway [32], healthcare professionals emphasized the structure of the pathway and the existence of clear referral points.

Only one study, concerning the LBRP Pathway [30], evaluated patient perspectives and experiences with the MoC. Insufficient transparency and information, clinician-led/paternalistic decision making, protocol-driven healthcare and compartmentalized services were identified as implementation barriers.

Multi-level determinants were recognized in both the LBRP Pathway [32] and TARGET [23]. In the LBRP Pathway [32], key decision-makers acknowledged timing and resource availability as barriers. Facilitators were concerned with the involvement of key commissioners, clarity in stakeholders' roles and responsibilities, and commitments to provide additional funding for upskilling and capacity building. In TARGET [23], while multiple-level factors negatively impacting implementation were not stated, monetary incentives and audit/feedback reports were identified as facilitators.

Underlying theories, models or frameworks

Only 5 MoCs (SCOPiC, MATCH, TARGET, BetterBack☺ and BAC) described being informed by implementation theories, models or frameworks, each serving different purposes. TARGET [22–24] and BetterBack☺ [25–28] used the Consolidated Framework for Implementation Research and the Theoretical Domains Framework, respectively, to identify determinants that might influence implementation outcomes. Additionally, BetterBack☺ [25–28] grounded its implementation strategy planning in the Behaviour Change Wheel [82]. The development of SCOPiC [44–46] was based on implementation theories, specifically the Normalisation Process Theory and Allen's conceptualisation of care pathways. In contrast, MATCH [21, 47] focused the selection of implementation strategies on the ERIC taxonomy. BetterBack☺ [25–28] and BAC [40] used evaluation frameworks, namely the *Framework to Evaluate Musculoskeletal Models of Care* [11] and the Victorian Innovation Reform Impact Assessment Framework, respectively, to determine implementation success.

Implementation strategies

Figure 2 outlines the strategies employed for the implementation of the MoCs. Of the 11 MoCs, BBPS [35], NE Essex PCT service [36] and BAC [40] did not report specific implementation strategies. BetterBack☺ [25–28], MATCH [21, 47] and TARGET [22–24] used a greater variety of strategies, while Irish STarT Back [42] and ISAEC [37] focused solely on the training of healthcare professionals. Notably, BetterBack☺ [25–28] was the only MoC connecting implementation strategies and preidentified barriers through the use of specific frameworks.

Eight MoCs (STarT Back, SCOPiC, MATCH, TARGET, BetterBack☺, LBRP Pathway, ISAEC and SSP) provided

Table 3 Context-specific factors related to determinants that may influence the implementation of the MoCs

Level		Barriers	Facilitators
System	**Low Back and Radicular Pain Pathway** [30, 32]	Barriers to implementation identified by key decision-makers: • The pathway did not fit with their regional priorities. • Clinical commissioning groups not considering the change a commissioning priority. • Lack of evidence-base and cost of the CPPP. • Lack of data to show that the pathway works.	Facilitators to implementation identified by key decision-makers: • Common understanding of how the pathway would differ from existing practice (e.g., evidence-base, decreasing variation in practice, shift away from invasive interventions).
Organizational	**TARGET** [23]	Barriers of risk stratification and referral processes identified by clinics: • Difficulty in identifying LBP patients (reported by 67%). • Issues with the use of technology (e.g., 79% reported issues with the use of tablets) • Lack of physician engagement (reported by 46%). • Competing priorities/lack of time (reported by 77%).	Facilitators of risk stratification and referral processes identified by clinics: • Compatibility with workflows. • Adaptability of the risk stratification process (clinics were able to use the method that fit best in their setting).
	BetterBack☺ [25–28]	Barriers to implementation: • Low confidence in skills/capabilities for improving LBP patient management. • Use of a biomedical treatment orientation rather than a biopsychosocial orientation. • Low awareness of the MoC. • Beliefs of negative consequences of the MoC.	NR
	Low Back and Radicular Pain Pathway [30, 32]	Barriers to implementation identified by key decision-makers and health care professionals: • Anticipate resistance from the GPs and consultants. • Necessity to secure a high GP buy-in. • Time constraints involved in using the template and completing the SBST. • Inappropriate referral of patients onto the pathway from the GP.	Facilitators to implementation identified by healthcare professionals: • Structure of the pathway. • Having a clear point of referral.
Patient	**Low Back and Radicular Pain Pathway** [30, 32]	Problems of the pathway identified by patients: • Insufficient transparency and information regarding how the pathway worked and involved services. • Clinician-led/paternalistic decisions on the management of the health condition. • Standardized care (protocol driven, so specific needs and circumstances not heard) • Restricted access to specialist care • Noncollaborative and compartmentalized services. • Insufficiently person centred.	NR
Multiple	**TARGET** [23]	NR	Facilitators of risk stratification and referral processes identified by clinics: • Incentives (reported by 54%). • 93% reported that they used the audit/feedback reports.
	Low Back and Radicular Pain Pathway [30, 32]	Barriers to implementation identified by key decision-makers: • Issues with timings and the availability of resources. Timing of the implementation of the pathway.	Facilitators to implementation identified by key decision-makers: • Good understanding of the roles and responsabilities of the different stakeholders • Involvement of key commissioners. • Commitments (e.g., additional funding for providers for upskilling and capacity building).

Abbreviatures: *CCCP* Combined Physical and Psychological Therapies program, *GP* General Practitioner, *LBP* Low Back Pain, *MoC* Model of Care, *NR* Not reported, *SBST* Start Back Screening Tool

training for health professionals and/or clinic staff and developed educational materials to support implementation. However, only 4 (UK and Danish STarT Back, SCOPiC, TARGET and BetterBack☺) reported the use of mentoring strategies, including ongoing consultation and educational outreach visits.

Five MoCs (UK STarT Back, MATCH, TARGET, BetterBack☺ and the LBRP Pathway) also reported

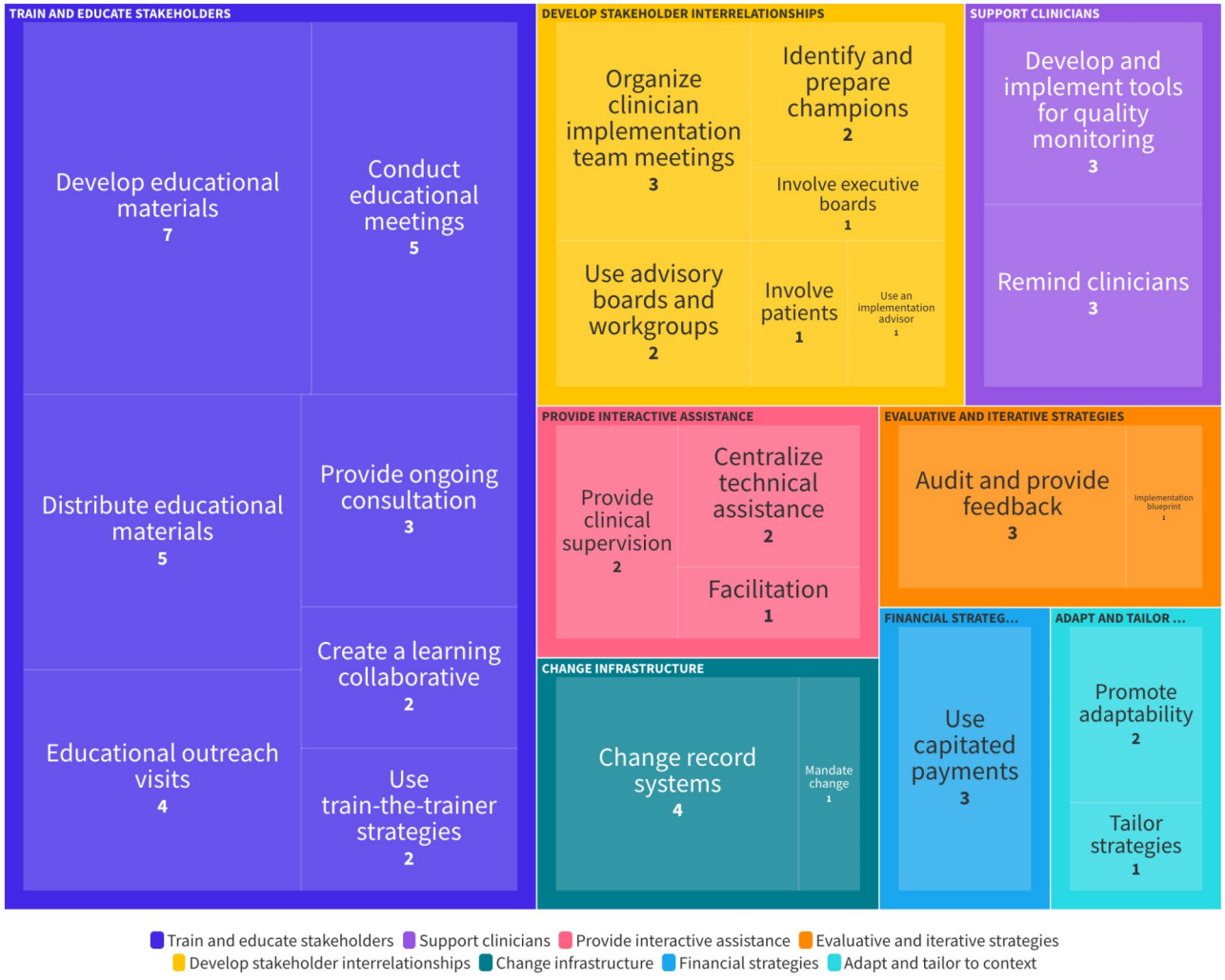

Fig. 2 Illustrative tree map of the strategies used for the implementation of the MoCs. Legend: The size of the rectangles is representative of the number of MoCs that used the respective strategy (*n* = frequency of MoCs)

strategies to promote the alliances between different stakeholders, such as team meetings, patient involvement, and advisory boards and workgroups.

Strategies to change healthcare service infrastructures were used by 4 MoCs (UK STarT Back, MATCH, TARGET and BetterBack☺). The most common approach involved changes in record systems to accommodate the fulfilment of instruments (e.g., Start Back Screening Tool), support clinical decisions about treatments, and facilitate team communication. Financial strategies, such as monetary payments for health institutions, clinic staff or healthcare professionals, were used by the UK STarT Back, TARGET [22–24] and SSP [38, 39].

Three MoCs (UK STarT Back, TARGET and BetterBack☺) developed evaluation methods for implementation, such as quality monitoring tools. More details regarding the implementation strategies of the MoCs are provided in Additional File 6.

Discussion

This scoping review aimed to map the available research on outcomes, guiding theories, context-specific factors and implementation strategies of MoCs implemented for the management of LBP patients in primary healthcare. Of the 11 MoCs included, 6 evaluated implementation outcomes; 5 were informed by theories, models or frameworks; 3 identified determinants influencing implementation; and 8 reported the use of strategies to support the implementation.

The rising burden of LBP has encouraged researchers, healthcare professionals and policymakers to enhance the effectiveness and sustainability of health services [9]. This growing interest has underpinned the implementation of MoCs in several countries, which are seen as key approaches to the uptake of research findings into healthcare practice and the promotion of integrated health services. However, it has been advocated that most implementation initiatives are not ready for widespread

implementation due to insufficient supporting evidence [83]. Our findings corroborate this claim, revealing a lack of evaluations for the implementation of MoCs, especially those driven by theories, models or frameworks.

Indeed, the use of theories, models or frameworks is foundational for producing evidence-informed knowledge, as they guide the implementation process and might provide valuable information on the best approaches to achieve change and evaluate outcomes [76, 83]. Our study revealed that only 5 MoCs used these tools to inform their implementation. Most were not used to define and evaluate the implementation strategy, but rather for specific purposes at different stages, such as redesign of the clinical pathway or classification of implementation strategies. The lack of guidance for selecting theories, models or frameworks that best fit implementation objectives has been described in the literature [53], a gap reflected in our results. Without these underlying tools guiding research hypotheses and appropriate reporting in studies, it becomes challenging to link implementation processes to outcomes and draw conclusions about their success.

This study found that only the BetterBack☺ and LBRP Pathway conducted comprehensive evaluations of implementation outcomes, whereas 4 other MoCs assessed only a few. Overall, although findings regarding the acceptability, appropriateness and feasibility of the MoCs are favourable, they contrast with the lack of demonstrated clinical effectiveness. This discrepancy may stem from most evaluations of outcomes occurring at earlier implementation, reflecting initial opinions and experiences of the stakeholders. Although most studies included follow-up periods of up to one year, implementation outcomes such as adoption, fidelity and implementation costs were rarely measured.

Consequently, the uncertainty surrounding the adoption of health interventions by healthcare professionals or their delivery to LBP patients may significantly impact health outcomes. Likewise, as identified in previous research [57], the evaluation of penetration and sustainability was absent in the studies included in this review. This represents a central gap in current research, as information on these long-term outcomes is essential for informing decision-makers about the real-world implementation of MoCs [84].

Eight MoCs employed implementation strategies, but the majority of the studies did not explicitly describe them. Most strategies were inferred through content analysis. Despite the variability found in our results, these findings align with those of previous studies, revealing that the most common strategies were training for health professionals and/or clinic staff and the development of educational materials [57, 85]. Given that educational interventions usually have a small impact on behaviours and outcomes [85, 86], we underline the importance of selecting implementation strategies according to pre-identified barriers within the healthcare context.

BetterBack☺ was the only MoC with a structured evaluation of the implementation strategy based on theories, models or frameworks. Although improvements in patient outcomes were inconsistent, its multifaceted strategy enhanced organizational and implementation outcomes. Identifying a successful combination of strategies may lead future researchers to replicate that combination [65]. Once again, aligning strategies with outcomes and ensuring adequate reporting might accelerate the translation from clinical to implementation research, thereby narrowing the research-to-practice gap [54, 64, 65].

The heterogeneity of the data found in this review may be explained by the complexity of the implementation processes and contexts. Previous studies have highlighted the challenges of sustaining changes in primary care [52, 54, 56, 87]. Implementation is often hindered by diverse patient-, organizational- and system-level barriers, which can impact outcomes, lead to inadequate changes, or result in incomplete adoption of health interventions, prompting the return to preimplementation behaviours [52, 85, 88]. Although addressing local factors is a critical initial step in the implementation process, our findings show that they were reported in only 3 MoCs. Notably, most factors varied across MoCs, with the exception of time constraints and competing priorities [23, 30, 32]. This variation may arise from differences in the level of implementation of the MoCs (local, regional or national), the stakeholders involved (patients, healthcare professionals or key decision-makers) and the data collection methods (focus groups, interviews or literature review). Moreover, theories, models or frameworks may help implementers in navigating these specific local barriers, guiding the selection and adaptation of implementation strategies [51, 54, 76].

This review has both strengths and limitations. To our knowledge, this is the first scoping review synthesizing the implementation processes and outcomes of MoCs for the management of LBP in primary healthcare. Together with the findings of the first study [67], which describes the characteristics of these MoCs, we believe our work provides valuable insights into current gaps in implementation research and addresses important challenges faced by implementers in real-world settings. Additionally, this review was conducted using systematic and rigorous scoping review methods [68, 69]. However, the heterogeneity in the data and different terminologies used across studies may possibly introduce information bias from the interpretation made by the two researchers who extracted the data. We attempted to mitigate this by using specific frameworks that conceptualize the constructs

under analysis [63, 77] and through an independent classification process. Other limitations include potential selection bias due to search strategies, language restrictions and ambiguities in MoC definitions. We addressed these issues by adopting a comprehensive search strategy, an overinclusion approach during screening, and regular reviewer meetings. Finally, patient and public involvement could have enriched our research and contributed to results that were more aligned with health needs.

Our study revealed that most MoCs are still in the research phase and have not been effectively tested for scalability within health systems. Future research may comprise a systematic review focusing not only on the effectiveness and cost-effectiveness of MoCs for LBP but also on implementation outcomes. This step is essential for assessing the methodological quality of available evidence and informing researchers how to replicate, adapt and test the implementation of the MoCs in their primary healthcare contexts. Likewise, studies informed by theories, models or frameworks should be conducted to identify context-specific factors that may influence implementation success, as well as to ensure adequate reporting of strategies to address these factors. This approach will help optimize the implementation process and facilitate conclusions regarding the outcomes achieved.

Conclusion

This scoping review provides a broad overview of the implementation processes and outcomes of MoCs for LBP patients in primary healthcare. Eleven MoCs were included, revealing significant heterogeneity in both the evaluation and reporting of the implementation process. Few MoCs identified barriers or facilitators prior to implementation or used theories, models or frameworks to guide it. As a result, implementation strategies and outcomes have been poorly reported in most MoCs, making establishing a clear relationship between them unreasonable. This variability underlines the urgent need to advance research in this field through high-quality effectiveness and theory-driven implementation studies.

This study offered a comprehensive understanding of implementation efforts and their alignment with outcomes. Such knowledge may assist researchers, clinicians, administrators and policymakers in navigating the challenges of implementing a MoC within their clinical settings and facilitate the replication of successful strategies in other contexts.

Abbreviations

BAC	Back Pain Assessment Clinic
BBPS	Beating Back Pain Service
ERIC	Expert Recommendations for Implementing Change
ISAEC	Interprofessional Spine Assessment and Education Clinics
LBP	Low Back Pain
LBRP Pathway	Low Back and Radicular Pain Pathway
MATCH	Matching Appropriate Treatment to Consumers' Healthcare needs
MoC	Model of Care
MRI	Magnetic Resonance Imaging
NE Essex PCT service	North East Essex Primary Care Trust service
PRISMA ScR	Preferred Reporting Items for Systematic reviews and Meta–Analyses extension for Scoping Reviews Checklist
QALY	Quality–Adjusted Life Years
RCTs	randomized controlled trials
SCOPiC	SCiatica Outcomes in Primary Care
SSP	Saskatchewan Spine Pathway
STarT Back	Subgroups for Targeted Treatment
TARGET	Targeted Interventions to Prevent Chronic Low Back Pain in High–Risk Patients
UK	United Kingdom

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

Supplementary Material 6.

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Authors' contributions

STD, EBC, PA, BH and DC conceived the study. HD supported the search process through the formulation of search strategies and literature search. Title and abstract screening were performed by STD and DC. Full-text screening and data extraction were carried out by STD and AM with the support of DC to resolve disagreements. Data analysis was performed by STD and discussed with EBC, PA, BH and AM. STD drafted this manuscript. All authors revised and approved the final version of the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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